

Trucks That Kill Page 63

POPULAR MECHANICS

MAY 1971
50 CENTS

16 Pages of **MOTOR
CAMPING**

ADD TO YOUR HOME

Builder's Price: \$16 a Foot

Our Price: \$6.50 Page 104

Indy 500: First Big One for Racing's Triple Crown

Your Home Movies on TV

Build a VW-Powered Plane for \$750

Page 94

Owners Reports:

International Travelall • Plymouth Satellite

HOW TO BUILD: Back-Yard Roller Coaster

Bookshelf Table • Colonial Cutlery Cabinet



For 1971, Chrysler presents...

The Unboreds



A very tough crowd. But they've got a way of breathing life into things, like weekends and things.

You'll need the password: "Chrysler Makes It Happen, Captain." And a way to move:

51 Chrysler outboards for '71, from Swinger 3.6 and new 12.9 all the way up to the 120 and Racing 135 hp. models. All with extra care in engineering.

Then, the '71 Chrysler boat line, featuring Conqueror (shown here)—the ultimate marine machine; luxurious and patented Hydro-Vees; and the deluxe, dressed-up cathedral models (all BIA safety-certified).

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THE MATADOR STATION WAGON

HAS MORE TOTAL ROOM FOR YOUR LEGS, YOUR HEAD, YOUR SHOULDERS AND YOUR HIPS THAN THE CHEVELLE, TORINO, OLDS CUTLASS, PONTIAC LE MANS, BUICK SPORTS WAGON AND MONTEGO.

Recognizing that in station wagons, room for inanimate objects is also important, the Matador has more cargo room than most of the above-mentioned competition.

And we make it easy to get to, because the Matador has a dual hinged tailgate as standard equipment.

To lure you with the promise of further comfort, the Matador offers the longest wheelbase in the intermediate class, coil spring seats and a 4-wheel coil spring suspension.

Despite all this, even the most expensive model of the Matador is priced to compete with all of its intermediate-sized competition.

Anyway you look at it, the Matador Station Wagon doesn't put the squeeze on you.

American Motors 

Matador's 200 cubic foot storage area is standard.

How far can a rim fire hunter shoot accurately? Remington research says, "150 yards."

Impossible? Not with the powerful, new 5mm Remington Rim Fire Magnum in the rifles we built to handle it. Here's the story behind our Models 591 and 592...straight from Remington designers and ballistics experts.

In experienced hands, a 22 rim fire rifle is an efficient small-game and varmint getter. But the effective range of a 22 rim fire cartridge is just about 100 yards. Beyond that, bullet drop is so severe that long-range hits are more a matter of luck than skill. (A 22 long rifle cartridge, for example, zeroed in at 100 yards, can drop 10.7 inches at 150 yards!)

Remember, a varmint's range of vision is greater than 100 yards, especially in open or flat country. So, unless you want to stay with short-range situations, you have to pack more power into the field.

Traditionally, varmint hunters looking for greater accuracy have turned to specialized center fire rifles and cartridges. But not everyone wants or can afford to give up the low noise and economies of rim fire shooting. So Remington-Peters developed a completely new rim fire cartridge—the 5mm Remington Rim Fire Magnum—and built the Models 591 and 592 to handle it.

The 5mm Remington ballistics are impressive. In fact, it's the fastest rim fire cartridge made. (For more details, check the ballistics chart above.) And its speed gives it the flat trajectory needed for long-range accuracy. (Sighted in with iron sights at 100 yards, the 5mm drops only 4.3 inches at 150 yards.) And it's the only rim fire cartridge made with the super-accurate "Power-Lokt" hollow point bullet...a perfectly balanced and concentric varmint bullet that can mushroom up to 35 caliber when it hits as a result of an inseparable bond between bullet core and jacket. The pictures give you an idea just how effective the 5mm is in the field.



Unfired 5mm-3mm recovered bullet (150 yds.).

RIM FIRE BALLISTICS			
	Muzzle	100 Yds.	150 Yds.
22 Long Rifle 40 GR. "Hi-Speed"			
Velocity (fps)	1285	1025	960
Energy (Ft/lbs)	147	93	82
Trajectory* Iron Sights (.7" AB)	—	0	—11.1"
Scope Sights (1.5" AB)	—	0	—10.7"
5mm Rem. Mag. 38 GR.			
Velocity (fps)	2100	1605	1400
Energy (Ft/lbs)	372	217	165
Trajectory* Iron Sights (.7" AB)	—	0	—4.3"
Scope Sights (1.5" AB)	—	0	—3.9"

*All Rifles Sighted in at 100 yds.

(Incidentally, the full-color, 48-page 1971 Remington-Peters catalog gives the ballistics for all Remington-Peters cartridges. A copy is yours for the writing.)

The 5mm Remington Rim Fire Magnum cartridge is so powerful we had to engineer a new bolt-action rifle to handle it. Six extra-heavy rotary lugs on the bolt engage grooves in the one-piece steel receiver and lock up tight. It's the same kind of multiple-lug lockup used in some of the most powerful Remington center fire rifles. And for added accuracy, the receiver is round for more precise bedding. Speaking of accuracy...

The Models 591 and 592 have the fastest lock time of any rim fire rifles made today. That means there's hardly any chance for you to stray off target after you've squeezed the trigger. To make the most of that incredibly fast lock time, and the inherent accuracy of the "Power-Lokt" bullet, the precision-bored barrel is mated to a steady, crisp match-type trigger.

We cut no corners on the Model 591 and 592. Both have full-size Monte Carlo stocks, 24-inch ordnance-steel barrels precision-rifled, crowned at the muzzle and blued for good looks and long wear. The only differences between them are their magazines and prices. The 591 handles a four-round clip and costs \$69.95*, and the 592 has a ten-round tubular magazine and costs \$74.95*.

Remington Reports are based on information supplied by Remington-Peters experts. We'll be glad to send you a free folder to keep them in. Just send a post card to: Remington Arms Company, Inc., Dept. 153, Bridgeport, Conn. 06602.



Remington® DU PONT PETERS®

Great guns deserve great ammunition. We make both.

Model 592

*Minimum Fair Trade prices in all states included in Remington's Fair Trade Program. In other states, these are the recommended minimum prices. Prices subject to change without notice. "Remington", "Peters", "Hi-Speed", and "Power-Lokt" are trademarks registered in the United States Patent Office.

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ON THE COVER: PM's bantam, all-metal planes photographed in flight over Statesboro, Ga., by Robert E. Barner. In front is Cal Parker piloting *Teenie Two*, his newest design (see page 94). Flying *Jeanie's Teenies* behind him are Bill Blye of Darlington, S.C., and Merle Miller of Savannah, Ga.

NEXT MONTH IN POPULAR MECHANICS

Build This Safe Scuba Sub for \$400. It's a two-man, underwater explorer.
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Owners Reports: They've driven them; now owners sound off on Dart and Gremlin.

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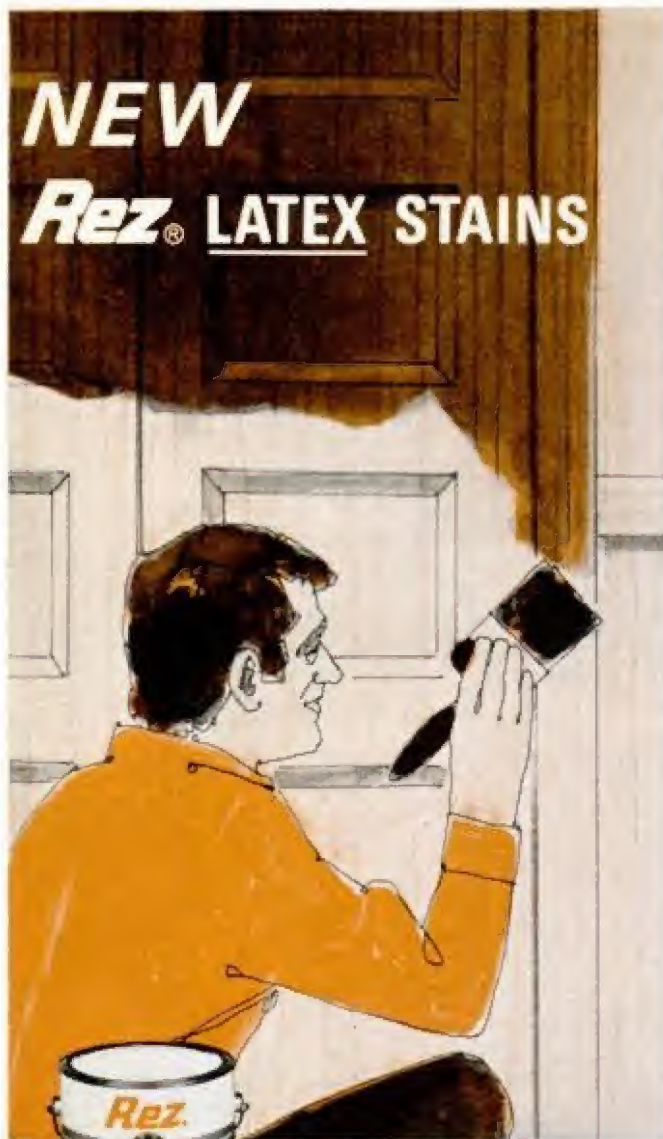
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LETTERS TO THE EDITOR

Coast-to-coast: Apples vs. bananas

Why? Why? Why are you always comparing apples to bananas? I can't believe it is *that* difficult to get a Ford apple and a Chevrolet apple for comparison. I refer to the Pinto with 75 hp and 3.55 axle compared to the 90-hp, 2.92-axle Vega (*Coast-to-Coast Test: Pinto vs. Vega*, page 76, March PM).

HOUSTON, TEX.

G. H. GALNY

We chose the base model of each line for the test. Besides, the Ford apple wasn't ripe; we really could not get a 90-hp when we did the test.

That's an unfair gas-mileage comparison. After numerous trips West, I've never failed to get from 1 to 3 mpg better mileage returning East. Westerly winds are the factor. A 5-mph wind could, on a round trip, make it Vega 24.5 and Pinto 26.5.

MARIA STEIN, OHIO

CYRIL HAUSFELD

Rather have a cold

Although the heavy doses of vitamin C recommended by Dr. Linus Pauling may provide some relief for the common cold (*Science Worldwide*, page 20, Feb. PM), a group of noted urologists have just recently discovered that intake of this chemical in such doses will form stones in the urinary tract. I rather think I would prefer the cold.

DURHAM, N.C.

ERNEST A. KUONEN

Polaroid is a scoop

I had an idea that Polaroid was coming out with a new camera and have been watching all the photography magazines. Not a word. Comes now *Popular Mechanics* with the scoop on *A Camera That Can Focus Itself* (page 82, March PM). My compliments!

INDIANAPOLIS

KARL L. FRIEDRICH

Surfers need spotters

You left out important information for newcomers to the sport in *Wake Surfing Is For Anywhere* (page 112, March PM). Some states require that boats engaged in wake surfing—as in water skiing—have at least two people in the boat. One acts as a spotter so the driver can concentrate on his job. Some areas also require wide-

(Please turn to page 8)

POPULAR MECHANICS

Are you still working for peanuts while others are making it big?

Why put up with a dead-end job and low pay while other men forge ahead to exciting promotions and big incomes?

There are many opportunities today for people prepared to fill them. Do you know how conveniently you can train to take advantage of these opportunities? You can do it without giving up your present job, or going back to class.

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enced hands. Your LaSalle diploma is a credential you can be proud of.

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LETTERS

(Continued from page 6)

angle mirrors. If in doubt, ask the local marine law-enforcement agency, or a member of the Coast Guard Auxiliary or Power Squadron.
WINNETKA, ILL. MICHAEL H. SCOTT

Houseboat is great

The PM Houseboat (page 160, Dec. '59 PM) was wonderful to build and is really great to live in. It handles perfectly, and



the accommodations for us are great. You have no idea of the number of people who run to the water's edge and ask us where we bought it.

ST. PAUL, MINN. MRS. CLYDE JOHNSTON

Short count

You stated in *How to Use the Tach-Dwell for Perfect Tune-Ups* (page 126, Feb. PM) that you find four-cylinder engines in Gremlins. Since when? I'd like to see a recount.

SEYMOUR, IND.

LESTER NEAL

Just lift up the hood and count: One, two, three, four . . . five . . . (gulp) . . . six.

Battery water from freezer

Mort Schultz gave good advice on battery water in *Automobile Clinic* (page 58, Feb. PM), but he should also have said that you can melt the ice that accumulates in a freezer and get water free from all minerals. For 30 years, I've melted this water, strained it through a nylon stocking and stored it in a clean jug—with excellent results and long battery life.

PHILADELPHIA

B. M. GOLDSMITH

Van to camper—'unbelievable'

The article, *From Van to Camper*—\$340 (page 148, Feb. PM), is unbelievable. The information is misleading and some of the

(Please turn to page 10)

POPULAR MECHANICS

It's the same truck. Same load-lovin' overhead cam engine. Same torsion bar front and heavy-duty rear suspension. Same steel girder frame. And a split personality.

The Datsun Busy body picks up on all the tough assignments.

A six foot all-steel bed and flat-loading tailgate take on surfboards, bikes, hay bales and branding irons. Tie down hooks all 'round see that they stay on.

Your Datsun dealer will show you a variety of campers that snuggle right in there, too. Switching loads is simple. You can take this

Busy Body on vacation over the weekend and put it back to work bright and early Monday morning.

Slip into the comfortable, hi-visibility cab. Latch onto the smooth shifting 4-speed.

Up to 25 miles per gallon economy and load-proven reliability.

About the best thing you can do with the Datsun Pickup is haul off and buy one. A lot of haulers have. It's the number-one selling import truck. And there's no two ways about that.

At just \$1916*, no wonder.

Drive a Datsun...then decide.

Busy body



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LETTERS

(Continued from page 8)

instructions could cause damage to the van and possible injury to the builder. The floor plan does not do justice to what can be done with a van. The methods of attaching various parts are poor. The instructions for cutting out the top of the van are dangerous. So is the way shown for venting the LP-gas compartment.

GOLETA, CALIF.

ROBERT ELDRIDGE

"The interior can be designed and appointed to suit your own taste," responds author Jeffrey W. Daum. "We designed the Tumbleweed specifically for two people. Torching the roof was very simple and extremely safe. Anyone who lacks experience can 'farm' the job out to a local body shop for about \$10.

"As for 'unbelievable,' I've logged over 32,000 miles, under all road and weather conditions, without the Tumbleweed showing the first sign of structural inadequacies (including squeaks, leaks, or cracks).

"Unfortunately, PM's editors did leave out my instructions for the LP-gas tank. [He's right; we did.] I said: Beneath the sink is a cabinet containing a sealed, outside-vented, LP-gas tank box. We built a 22-inch-wide cabinet that houses an inside-access, airtight box to store the tank. The tank box is vented directly to the outside of the van in case the tank's safety valve should release some gas."

Quieter stump burning

Your method of burning a stump with an open-end barrel and vacuum cleaner is noisy and not very convenient (*Solving Home Problems*, page 166, March PM). I drill a lot of holes in the stump (quarter to half-inch in size), then saturate the stump with kerosene. The next day I light it and put an electric fan nearby. This keeps it burning and makes a quick, quiet job of it.

DAVENPORT, IOWA

HAROLD NEIBERT

Replacing Niagara Falls?

Since George Reiger's *Honeymoon on a Houseboat* (page 102, Feb. PM) appeared, we've received requests from readers in 36 states for additional information about the Arkansas River.

DEPT. OF THE ARMY

COL. WM. C. BURNS,

CORPS OF ENGINEERS

DISTRICT ENGINEER

LITTLE ROCK, ARK.

'We're not punks'

In regard to some of the comments un-

der "Middle-Aged Men in the Streets?" in *Letters to the Editor* (page 6, March PM), I do not like being called a "punk" as Mr. Godfrey calls young people. After all, pretty soon young people are going to take over the country and are going to start running it.

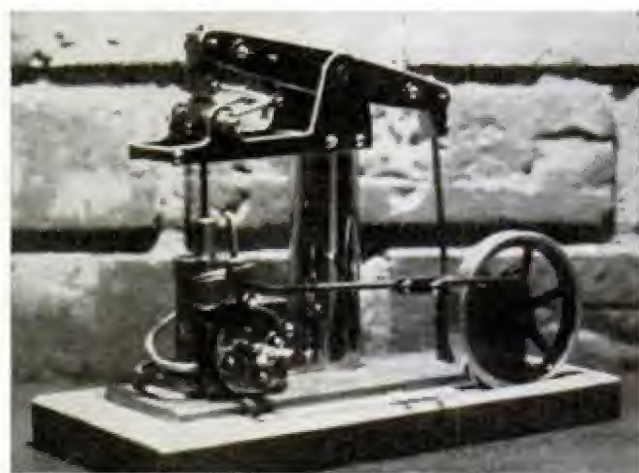
And as far as Mrs. Lee is concerned, I have yet to see a 15 to 16-year-old riding a Harley or Indian since these are rather large machines and are rather expensive, too!

YAKIMA, WASH.

MICHAEL WEISS

Walking-beam engine

It took me about 40 hours to build your *Model Walking-Beam Engine* (page 156, Aug. '69 PM), and it turned out to be a



fine working model. It runs at about 120 rpm on 25 p.s.i. air pressure. I am in grade 12 and built it as a school project.

WEST VANCOUVER, B.C.

STEVE RICHARDS

Mechanics . . . and more!

It was in *Reader's Digest* that I read a reprint of that marvelous article, *The Truth About Pet Foods* (page 123, Oct. PM). I thought *Popular Mechanics* was for mechanics! Will read *Mechanics* more often.

VACAVILLE, CALIF. MRS. JOANNE WAGGONER

Racing Guide poster

A friend of mine has a beautiful poster of 1971 competition cars. He says he ordered it with a coupon printed in *Popular Mechanics*. Can I still get a copy?

OLD GREENWICH, CONN. DOUG STEWART

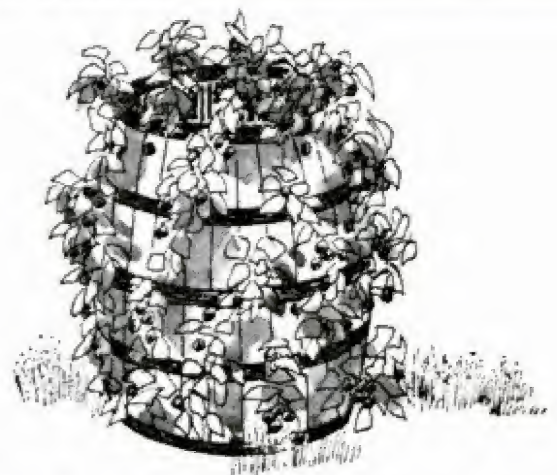
Yes, you can. The poster is the *Camel Filters/Popular Mechanics Guide to Competition Cars*. Simply send \$1 with your name, street, city, state and zip code to Racing Car Poster, P.O. Box 9808, St. Paul, Minnesota 55177. ★ ★ ★

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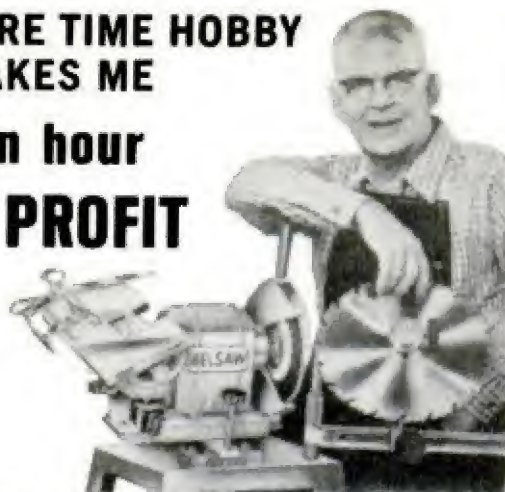
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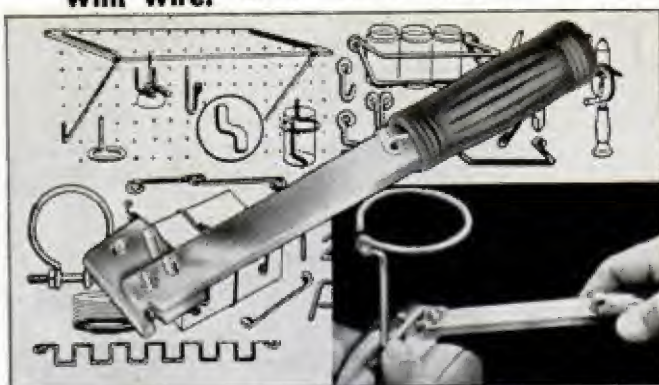
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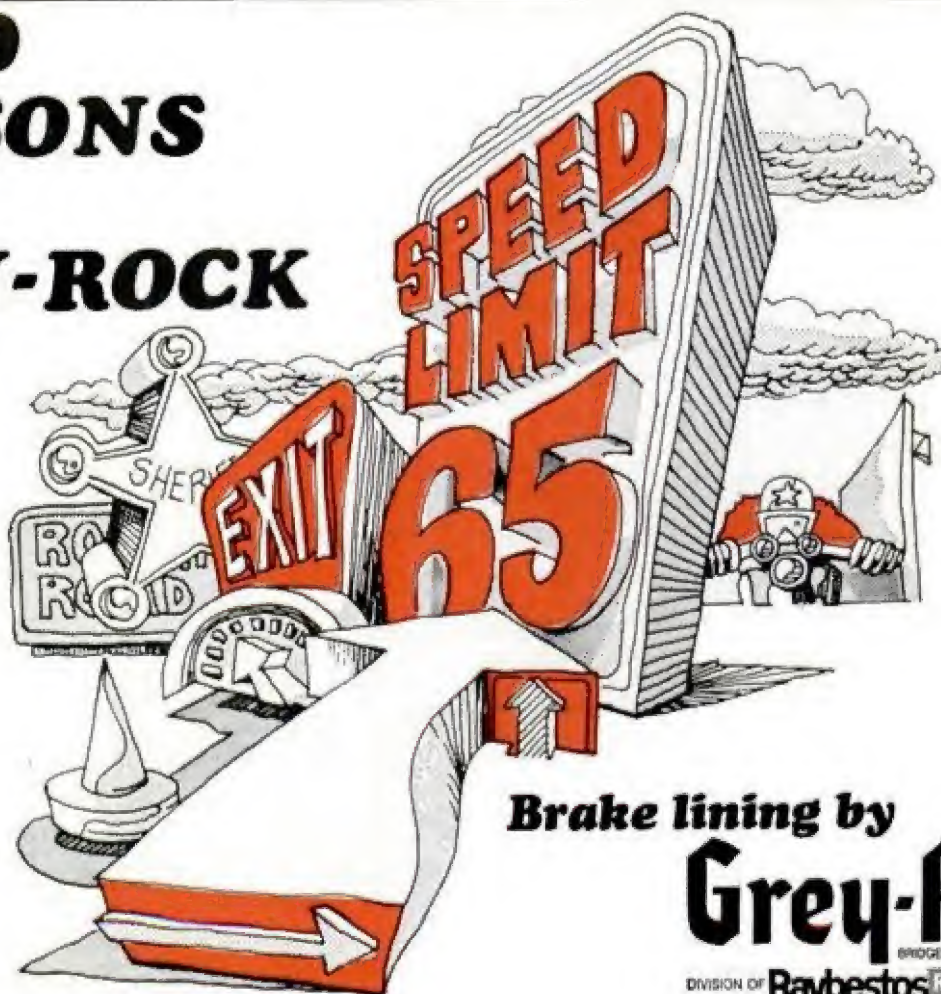
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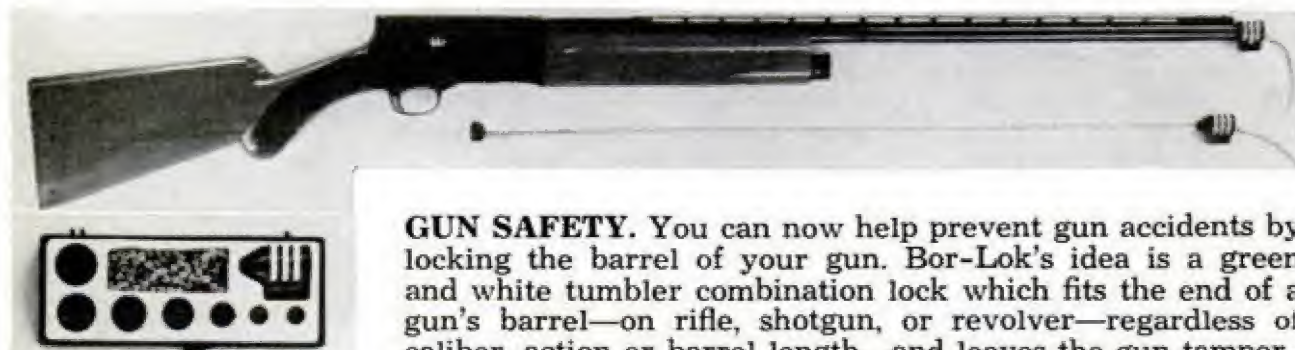
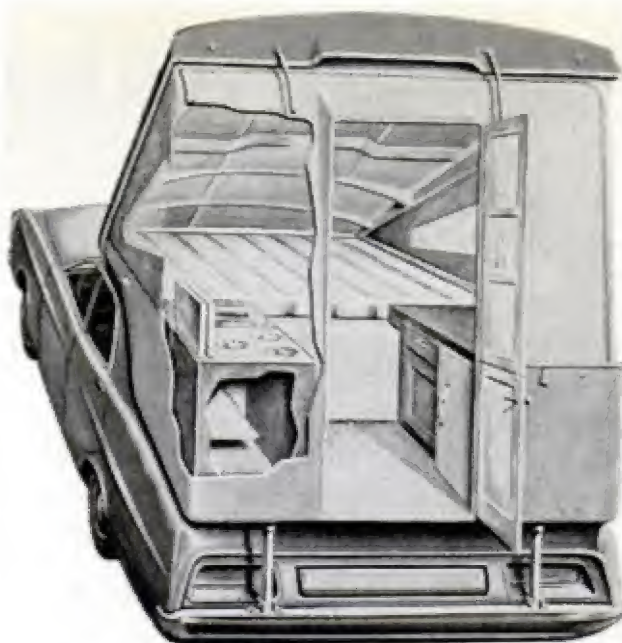
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BY SAM MAZUR

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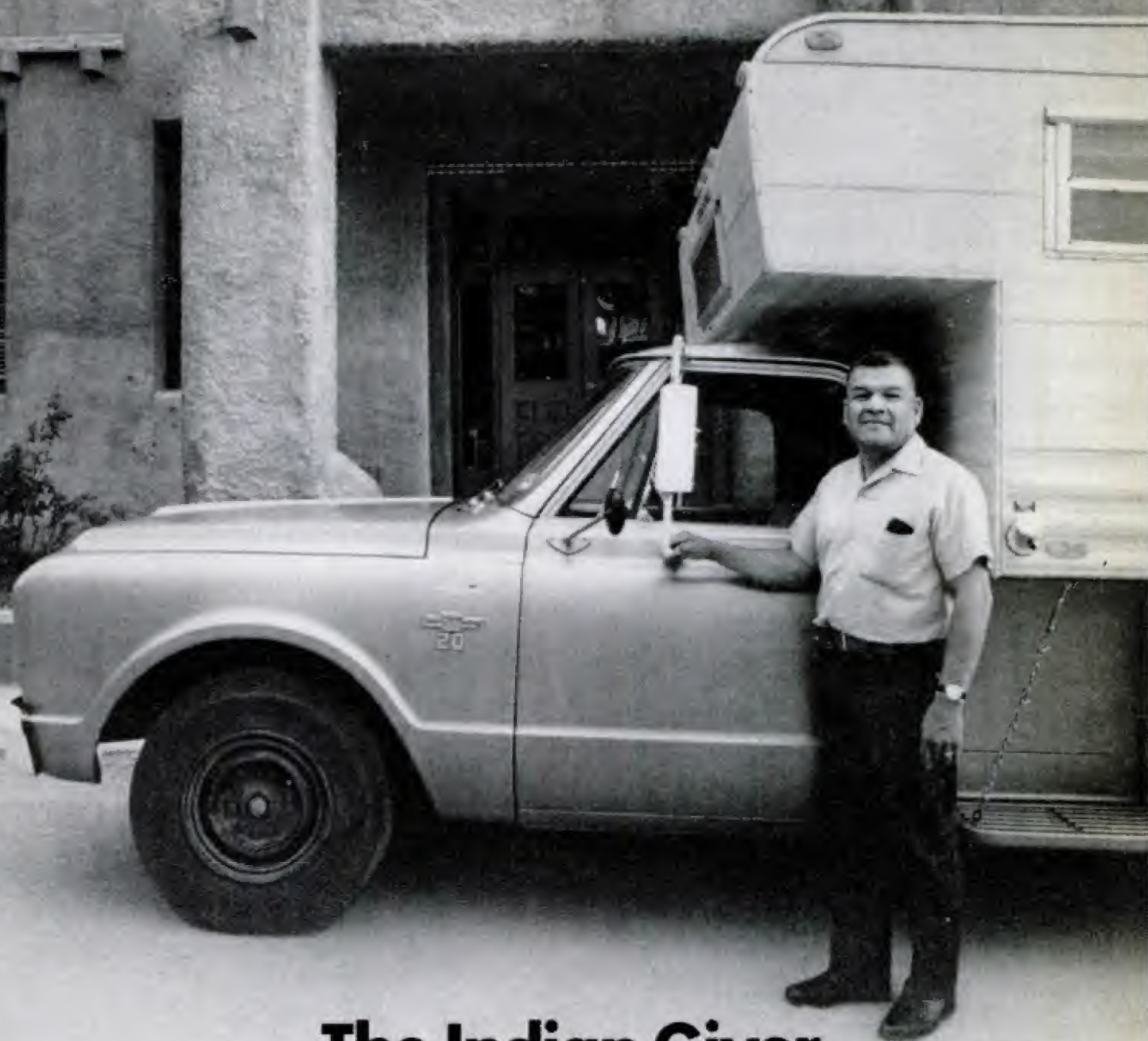
GUN SAFETY. You can now help prevent gun accidents by locking the barrel of your gun. Bor-Lok's idea is a green and white tumbler combination lock which fits the end of a gun's barrel—on rifle, shotgun, or revolver—regardless of caliber, action or barrel length—and leaves the gun tamper-proof. This lock is ideal if children are near. Enclosed in a

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BALANCE. Pete Alport, noted outdoorsman, says it's a fallacy to believe that heavy lines give you better odds in catching fish. A sure way to better fishing is to fish with a rod, reel and line that are balanced. You can probably catch *any* fresh-water fish that swims—on an eight-pound-test line! A thin line casts better; presents the lure better; and will enable you to land any fish you're likely to hook. Remember the last time you snagged your hook on a log and had to wrap the line around your hand and pull to break it loose? A thinner, lighter line is the answer.

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Human blood can extract chemicals from the plastic bags used to store it, according to a report in Chemical & Engineering News, and possibly do harm to recipients. The contaminants—plasticizers added to polyvinyl chloride (PVC) to make it flexible—migrate to the blood in amounts directly proportional to the length of time of storage, states the report. One plasticizer, according to Dr. Robert J. Rubin, associate professor of environmental medicine at the Johns Hopkins School of Public Health, has a great affinity for lung tissue. He notes that there is an increasing occurrence of "shock lung" in the United States and in Vietnam among our soldiers. This condition is characterized by an impeded flow of blood in the lungs, which reduces the available oxygen. Dr. Rubin urges further study of the problem and questions the continued use of certain plasticizers in wrappings for foods and tubing for heart-lung machines.

Lunar rocks are eroded at a rate of about one layer of atoms a year. That determination was made by General Electric scientists after studying a glass filter from a TV camera aboard Surveyor 3. After 31 months on the moon, the camera was removed from the spacecraft by the Apollo 12 astronauts and returned to Earth. Measurements of the density and depth of cosmic ray tracks in the glass filter allowed the scientists to calculate an erosion rate: a half inch of rock every 60 million years. In addition to cosmic rays, the moon is bombarded by meteoroids (from specks of sand in size to large chunks of rock) and the solar wind (charged particles that stream from the sun).

Mead—the honey-based wine quaffed by mythological gods as well as thirsty ancient Britons—is back! It's being produced at Cornell University by two scientists who want to provide Americans with a refreshing alternative to fruit wines. Their process depends on a "unique blend of acids, nutrients and selected yeasts." The wine is aged for two to six years. "A good mead wine has a strong lemon color," say the two mead-makers, "and a mild flavor and a slight natural carbonation."

Electronic implants may someday replace conventional hearing aids. So says Stanford University's Dr. Richard Goode, an ear, nose and throat specialist who maintains that the know-how for developing electronic hearing implants is now available but that more animal research is required. One device in the works employs a tiny magnet implanted in the eardrum or ear bones. An amplifier with a microphone is worn behind the ear, but instead of an earphone, only a small output coil is used. Amplified electromagnetic waves then radiate from this encased coil to the implanted magnet. The magnet moves, driving the bones and eardrum, producing the sensation of sound. The idea, according to Dr. Goode, "is to electronically trick the brain into thinking it has received 'normal' sound waves."

Chronic high irritability, possibly affecting our whole society, may be one of the major results of a polluted environment. That's the opinion of Dr. Alfred Strickholm, an Indiana University physiologist who specializes in determining the effects of chemicals on nerve cells. "Society may be suffering from subtle sicknesses to which pesticides and other pollutants are contributing," says Dr. Strickholm. "People can be sick all the time and not know it. They can feel rundown, chronically bad, and think it normal."

Clothes will be sprayed on in the 21st century. That's the prediction of Illinois Institute of Technology students in a class devoted to developing concepts of future life in America. The spray-on suit would be worn under an almost weightless outer gown. At night, people would peel off their clothes and toss them into a recycling unit.

★★★

To hell with the rust of the world!



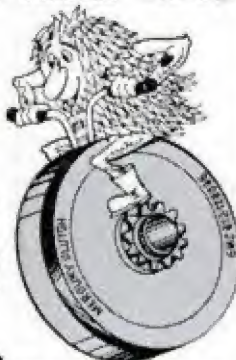
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MAY 1971

21

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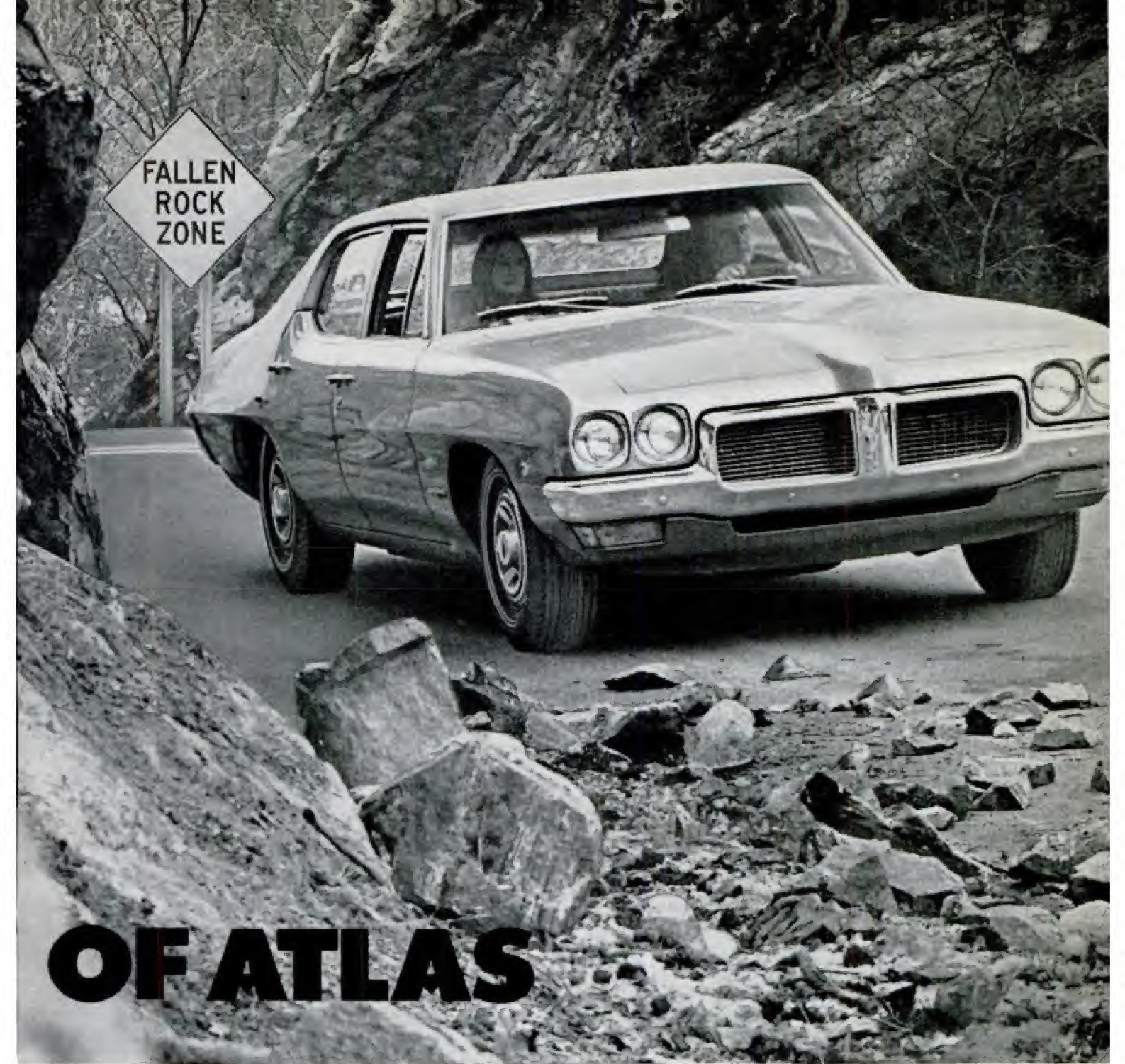
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Subaru:



Is It Here to Stay?

Because we've had the experience of driving this hot 1100, because the dealers number over 500 and because Subaru's president left VW (!) to bring them here, we'd say 'yes!'

By **BILL HARTFORD**, Auto Editor /Photos by Irv Dolin

THE OLD JOKE is that it's impossible to get a speeding ticket in a small, imported, economy car—it just won't go fast enough. The real joke, however, could have been a speeding ticket for me when I found that the exhilaration of driving the Subaru 1100 made it difficult to stay under the speed limit!

I didn't have the opportunity to verify the claimed 90-mph top speed of the Subaru, but I did spend all of my out-of-city driving time cruising well over the 70-mph mark, and was always aware of plenty more pull in reserve—pull that was uniquely vibration-free right up to red-line rpm. Haul it down from the strangely smooth, high-speed straight and narrow into country-road twists and turns (which the small sedan negotiates more like a sports car specifically designed for such driving), and you realize what's happening up front: The Subaru has front-wheel drive (and it's only a \$1900 car in

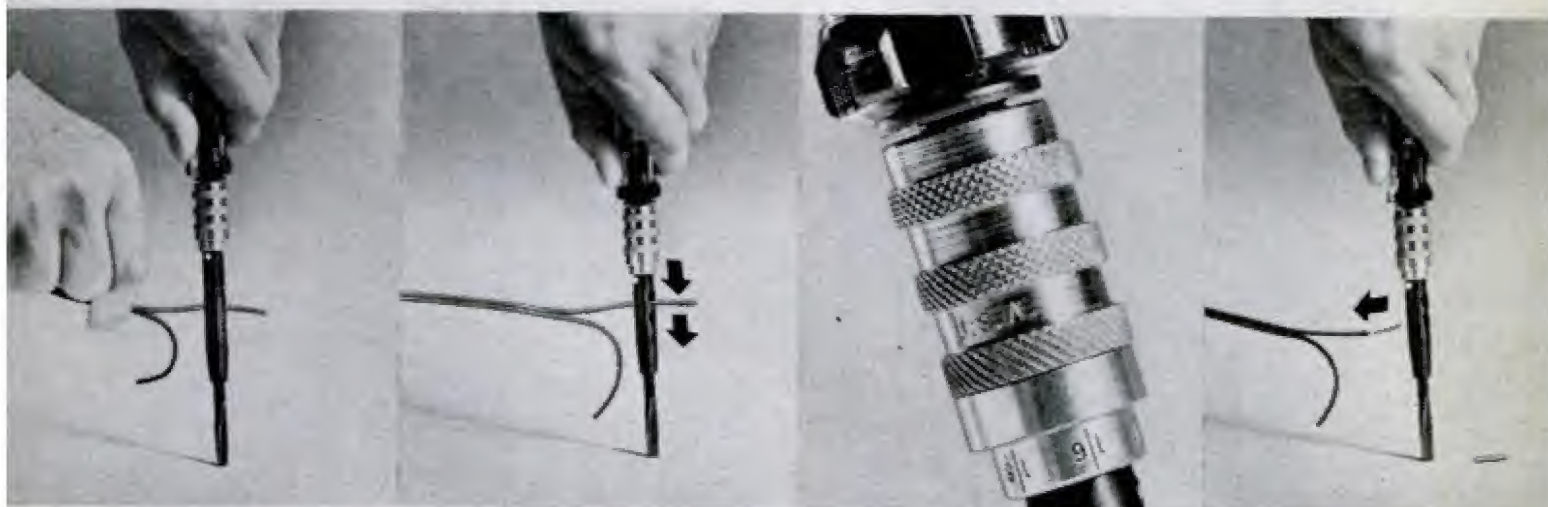
the two-door version, remember), and the engine geared to that fwd is of horizontally opposed cylinder configuration. Its vibration-canceling effect is a bonus over and above the almost 1 hp per cu. in. of the 1088-cc (66-cu.-in.) Four, making it both smooth and powerful for its size.

A dual-radiator system for the water-cooled overhead-valve engine eliminates the need for a radiator fan and the passenger compartment is quieter as a result. Inboard front brakes (drum) contribute to handling by reducing unsprung weight, and absence of drive-train tunnel is a boon to driver and front passenger.

I drove the four-door sedan, which is accompanied by two-door and station-wagon models in the Subaru lineup. (Subaru gets equal syllabic emphasis in pronunciation.) Creature comfort is good: Buckets are fully reclining; controls and instruments are well-placed, and the dash

(Please turn to page 26)

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SUBARU: IS IT HERE TO STAY?

(Continued from page 24)

is both handsome and utilitarian; spare tire is under the bonnet (hood) leaving the entire trunk even more room—and it's large and well-finished to begin with.

This latest arrival from Japan (Fuji Heavy Industries) is, with already 500 dealers nationwide, well on the way to building a strong service organization. It's also forcing into a more difficult decision, the Japanese-oriented, small car buyers who are eeny-meeny between the Datsun 1200 and Toyota Corolla. Now there's the Subaru to consider also. The car certainly ranks high among the world's nondescript small sedans. Yet the Subaru is a most exciting car by virtue of how it drives and the engineering that makes it drive that way. ★ ★ ★

SUBARU SPECIFICATIONS

Dimensions of sedans (wagon slightly different)

Overall length	155.0 in.	Tread, front	48.2 in.
Overall width	58.3 in.	Tread, rear	47.6 in.
Overall height	54.7 in.	Weight	1630 lbs.
Wheelbase	95.2 in.	Turn circle	31.5 ft.

Engine type: Two pairs, horizontally opposed, water-cooled, four-stroke, ohv

Displacement: 1088 cc (66.4 cu.in.)

Compression ratio: 9.0:1

Horsepower: 62 @ 6000 rpm

Transmission: Four-speed, all synchromesh

Steering: Rack and pinion

Fuel tank capacity: 9.5 gal.

Suspension: Front: Wishbone type, independent

Rear: Trailing arm type, independent

Brakes(f/r): Drum/drum

Tire size: 6.15-13



THE WHAT? THE SUBARU is how company's bumper sticker reads to assist identifying shape with name

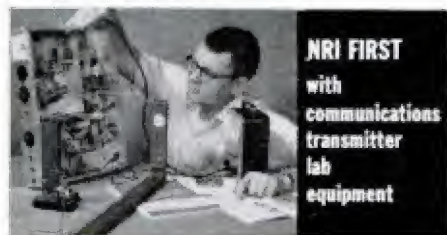
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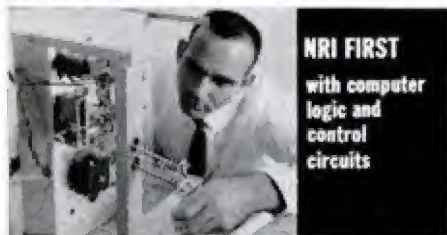
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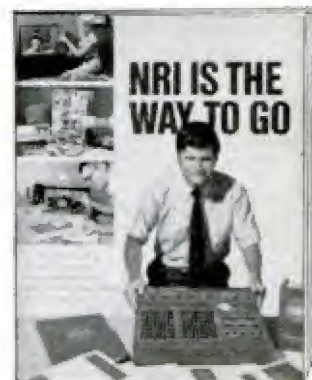
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DETROIT

LISTENING POST

BY ROBERT LUND

NEW MINIS ARE BORROWING SALES FROM SISTER CAR LINES instead of cutting into the imports, though nobody in Detroit wants to admit it. Unless this borrowing is halted and the subcompacts give a better account of themselves versus the imports some low-priced domestic cars caught in the pinch could be dropped—perhaps next year. There could be another reaction from Detroit if imports continue to drive deeper into U.S. territory. The pressure might provide the spur Detroit needs to get going on true mini-cars in the VW/Toyota league.

PRICE INCREASES ARE VIRTUALLY CERTAIN ON MANY CARS in the low and medium-price field this fall. And, for a change, not because of new safety gear made mandatory by the government. There's a keen rivalry among carmakers to match each other item-for-item on low-priced and medium-low-priced cars. For example, if A offers disc brakes as standard and B charges extra for the item, B will probably make discs standard on its '72 products. The add-ons will be tacked on the new-car price tags.

WILL CAR ROOFS RISE AGAIN? Car designers have won the argument to lower them, but now the pendulum may be ready to swing the other way. The government's talking about a standard for cars that wouldn't allow the roof to cave in more than five inches under 5000 pounds of pressure. Some safety authorities say the ruling should go beyond that and fix a specific number of inches of clearance that should remain between the top of the driver's head and the roof after the roof has been subjected to a five-inch cave-in. The only way to accomplish that would be by raising the roof.

NEXT INNOVATION ON STATION WAGONS could be a pull-out ramp that slides up into the floor of the vehicle. Ford has the item on a one-of-a-kind Montego, but General Motors may be first with a production version. The Ford version operates electrically. GM's working on two types—one automatic, another in which the ramp is raised and lowered manually.

IMPROVED VERSIONS OF INTERNAL COMBUSTION ENGINES emphasizing small size, light weight and economy are a must for Detroit's full attention rather than Wankels, in the belief of some automen. There's nothing wrong with the ICE if the pollution problem can be licked, but the closer the industry gets to solving that problem, the less efficient the piston engine becomes in terms of mpg. General Motors is believed to have a small engine in development that promises to deliver in both departments—low or clean on pollution; a money-saver on mileage.

WHICH WAY THE WANKELS? GM executives say the company still hasn't made a definite decision on the Wankel engine; whether to go with it or scrap it. But what GM isn't telling is that it has worked out a step-by-step, chronological program for building and testing X number of engines a year over the next two years. This approach calls for a sizable investment and GM isn't known for putting its money down rat holes.

There's a widespread notion outside Detroit that if the industry goes to the Wankel, cars will cost substantially less. This assumption is based on the fact that a Wankel requires fewer parts than a piston engine. Roughly half as many. Supposedly, the less complicated a machine is, the fewer parts are used to put it together and the less it costs. But the theory doesn't always work out in practice. A Japanese car manufacturer selling both a conventional engine and a Wankel in Australia gets \$160 more for the Wankel than for the piston. And Japanese wages are a quarter to a half of what Detroit pays. How come? Just a guess, but the price on the Japanese Wankel probably includes

(Please turn to page 30)

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DETROIT LISTENING POST

(Continued from page 28)

a markup to enable the company to pay off the investment it has in plants, machinery and royalties to put the engine into production. So, if and when Detroit decides to bring out a Wankel, car prices aren't going to be shaved by much—maybe not at all.

Bendix, a major supplier to the auto companies, confirms that it's reworking its electronic fuel-injection system so it can be paired with a Wankel. The company obviously thinks the Wankel has a fair chance of making it in Detroit.

BUCKING THE SMALL-CAR TREND, at least one make will grow longer and larger this fall. Ford will put the stretch on Thunderbird, with a wheelbase three inches longer. The new model will also cost more than the current car.

ONE OF THE BIG THREE engineering departments that applied for an appropriation to install an experimental turbine in a passenger car got turned down on the grounds that any nonpiston experimental job supplies fuel for industry critics pushing Detroit to dump the piston engine. Critics invariably greet any nonpiston development out of Detroit with exclamations of, "See, they can do it if they want to." If there's another turbine car—car, not truck—to come out of Detroit within the next couple of years, you can bet that it will be fairly close to production and not just a press agent's ploy.

A SLIDING VINYL SUNROOF is now available on Pontiac's Ventura II and on American Motors' Gremlin, Hornet two-door and Sportabout wagon models. The desirable (especially for this time of year) option provides a much larger roof opening than the sliding sheet-metal type.

THERE'S A NEW bimonthly magazine for auto enthusiasts who enjoy reading about old cars. *Special-Interest Autos* features nonantique, nonclassic collectible cars that most of us can still afford—everything from Model A Fords to Hudsons, Kaisers, Nashes, Avantis, Eldorado Broughams, early Olds 88s, Willys, two-seater T-birds. Format includes road tests and articles on such subjects as retractable hardtops, Edsel speedsters, three-wheelers, 35-year-old stock-car races, plus how-tos and histories. *Special-Interest Autos* is the hobby of PM's West Coast editor, Michael Lamm. Available by subscription only, \$6 a year. *Special-Interest Autos*, Box 196, Bennington, Vt. 05201. ★★ ★



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Three top pros challenge you to come up with an imaginative use for General Electric Silicone Seal or Silicone Lubricant. Something they may not have thought of.

With the sealant, home-and-shop expert Wayne C. Leckey dabbed rubber "feet" onto a trinket chest, sealed a rain gutter and caulked a bathtub. With the lube, he sprayed a fishing reel, some stuck drawers and all of his tools.

On his Chaparral 2J, Jim Hall used Silicone Seal to make formed-in-place gaskets, to seal all electrical connections, and as an adhesive to hold components to the body. Then he spray-lubed the throttle linkage, suspension ball joints, wheel lugs and battery terminals.

Using the seal, electronics expert Larry Steckler repaired a speaker cone, and sealed an antenna lead-in feedthrough and outdoor antenna terminals. With the lube, he sprayed telescoping auto and TV antennas, a record changer mechanism and slide, and an antenna rotator.

Now here's what you can do: send in another use for either product, different from those mentioned above, and enter our sweepstakes. (To win, all you must do is fill in your name and address and the name and address of the store where you saw GE Silicone Seal and GE Silicone Lubricant on display.)

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Popular Mechanics

Drivin' with Dan

Do driver techniques vary for different race cars? What's the best material for racing drivers' suits? Will lead-free gas doom high-performance cars? Dan Gurney answers these and other automotive questions

Q. On a given road course, would a driver use the same techniques of cornering, braking and accelerating for Indy cars, stock cars and Can-Am cars?—Arthur Davis, Chicago.

A. Technique is hard to define in this instance. I would say that a driver's "style" would be apparent in each of these events. Stock cars would require an entirely different approach in braking. A stock car responds

much more gradually. An Indy car has a slightly quicker response than a Can-Am car. They are equally difficult to drive against top competition.

Q. How are race courses measured? If they are measured in the middle, then wouldn't a race like the Indy 500 actually be less than 500 miles due to the location of the groove?—Dan Rendant, Arcadia, Calif.

A. Yes, it probably would. Indy is measured around the inside white line. Some tracks are measured in the middle and some along the outside.

Q. I have noticed in your pictures that you seem to wear Nomex suits. From your many years of experience and your high safety consideration, what type material do you believe to be best? (I had thought Durette was superior).—Neil Sweetland, Fresno, Calif.

A. As I understand it, Durette is treated Nomex that will last about 5 seconds in an open flame against approximately 4 seconds for Nomex. Simpson makes a suit which I used to wear, with Nomex outside and Kynol inside, that is quite a bit better—maybe 10 seconds. The underwear is very important, too. Some new fabrics being researched are better still.

Q. Do you have trouble breathing when wearing the new full-face helmets like the Bell Star?—Steve Bohman, Stratford, Wis.

A. Not at all. The window does fog up easier when you are not moving, but antifog solution supplied with new helmets eliminates this problem. I'm a believer in these helmets. One soon becomes accustomed to wearing them. They are certainly not foolproof, but I

(Please turn to page 34)



'71 EAGLE PROTOTYPE as it appeared earlier this year. Car ran in this configuration at first USAC race in Argentina where Swede Savage placed fourth. Car will be essentially same for Indy this month. It uses prominent side fins for aerodynamic downforce instead of the usual transversely mounted rear wing

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DRIVIN' WITH DAN

(Continued from page 32)

think they are the best protection now available. They also protect your face and teeth when you're in a race where cars or cycles in front kick up a lot of gravel. It feels like you're driving a mini-coupe!

Q. *I wonder if the lead-free gas of the future will make it impractical to buy a high-performance, high-compression car? What is your opinion?*—Peter Mazur Jr., Plymouth, Pa.

A. As long as there is life in the public, they will want performance. Lead-free gas can still give high performance. High compression is not the only way you can get it and lead is not the only way to obtain high octane. Lighter and more agile cars are one answer.

Q. *What is a Matra-Simca?*—Steve Hansborough, Vienna, Va.

A. It is a French industrial combine. Matra does many things including military missile work. Simca is a French auto manufacturer owned mostly by Chrysler. They pooled their talents and have been building a Grand Prix racing car.

Q. *Would adding duals and headers to a '63 Ford, (352-c.i.d., 2-bbl. carburetor) be worth the cost in saving gas and engine wear?*—George Efurd, Malvern, Ark.

A. I doubt it. However, it might perform better and be more fun to drive.

Q. *Lately I have heard much news about adapting cars to natural gas. Do you know where the adaption devices can be bought or who makes them?*—Vaughn Treude, Dickinson, N.D.

A. Yes, and a few have even been raced. See *Propane Power! Should You Switch to L-P Gas?*, page 85, Oct. '70 PM. The best way to get information about conversions is to check with an L-P gas company in your area.

Q. *Did your experience in Grand Prix Formula 1 racing help make you unbeatable on the USAC road courses?*—Ned Tander, Oakland, Calif.

A. I certainly wasn't unbeatable, but, of course, it helped a lot. Any sort of road-racing experience will help when you are road

(Please turn to page 36)

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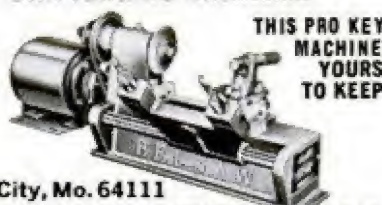
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DRIVIN' WITH DAN

(Continued from page 34)

racing. And having a good crew, a good car and a dedication throughout the team is very important also—not to mention a little good luck!

Q. Are there many provisions made for cooling of the engine on dragsters?—Herbert Davis, Greensburg, Pa.

A. It's my understanding that they now run water in the cylinder heads only. They have the block full of epoxy resin to help support the cylinder walls. They drain the heads after each run and put a fresh load of water in for the next.

Q. If a 9-to-1 ratio, 304-c.i.d. V8 is raised to a 10.5-to-1 compression ratio, will the gas mileage change and about what would the increase in power be?—Dick Chapman, King of Prussia, Pa.

A. That's a difficult question but I'll make a guess. I'd say maybe ½ mpg less and 15 hp more. The automobile companies could give you a much better estimate. I have never made such a test. Usually, when raising the compression, we have done more work with cam and inlet and exhaust systems and then we drive the car harder. Mileage suffers mostly because of the change in driving technique. Many racing engines, by the way, have compression ratios in the 9s.

Q. Could you tell me about driver Swede Savage? I saw him win the last USAC race of 1970 on TV. Wow!—Doug Huffines, Doraville, Ga.

A. Swede (David) Savage is 24 years old, a graduate of go-karts, quarter midgets and A.M.A. motorcycle racing. He has also raced Class A motorcycles, Cam-Am, Trans-Am, Indy road racing, Grand National stock cars and a few others. He loves to race and has studied many facets of racing while working at All American Racers here in California. He is also intelligent and good looking and a very promising young professional race driver who will be in an Olsonite Eagle for the '71 season (see photo, page 32). ★★

If you have questions on racing, high-performance and everyday driving techniques, send them to "Drivin' with Dan," c/o Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. Questions cannot be answered by individual letters. Questions on maintenance and repair should be addressed to the Auto Clinic (see page 46F).

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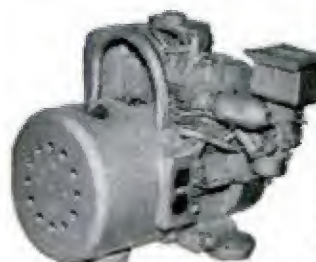
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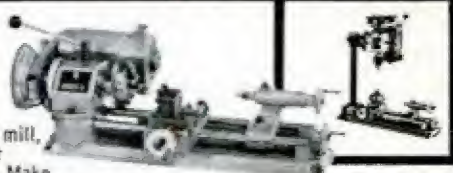
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By HARRY WICKS, Workshop Editor



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FASTEST HAMMER ON THE JOB is yours with Hammer Saddle. Available by mail for \$1, the belt-worn carrier keeps hammer available without the need of having to pull it up by the head. Corvel Co., Box 507, Geneva, Ill. 60134.



HOOK BLADE UTILITY KNIFE for linoleum, vinyl tile, leather, cardboard, canvas, roofing and building paper features a hook-type blade that is completely retractable. Claimed to cut more quickly and easily than straight blades, the blade locks into material being cut and slices with little pulling effort. There's no chance of dulling tool when cutting against concrete because rounded tip protects blade. LRK Knife, \$1.39; Allway Mfg. Co., 1513 Olmstead Ave., Bronx, N. Y. 10462.

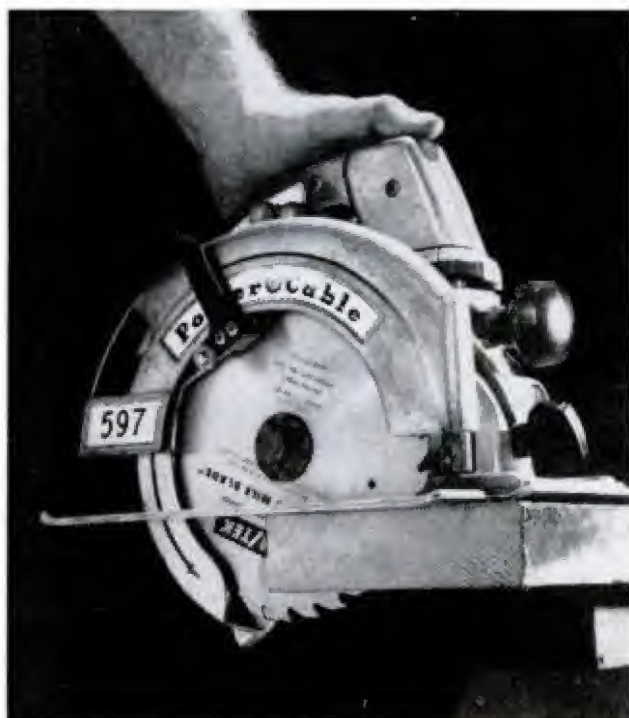
STRAIGHT DRILLING, horizontally as well as vertically, with your portable electric drill is assured with the easily mounted, shockproof level dubbed Drill-Align. Maker claims that laboratory experiments with tool have produced accuracy of .012 in. per inch. Encased in semihard rubber, instrument is easily fastened to drill with adhesive that's supplied. Price: \$3.95 plus 15 cents handling charge from Proven Products Co., 19644 Ventura Blvd., Tarzana, Calif. 91356.

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NEW CIRCULAR SAW BLADE, made of Swedish steel, has a thin layer of hard tungsten carbide electronically alloyed to the tips of the teeth to prolong sharpness. Guaranteed to cut a half-mile of 2-in. construction lumber before dulling, it's available in combination crosscut and rip design. \$3.95 ppd. Em/Tek Tools, Brookfield, Wis. 53005.



MORE TIME SANDING and less time changing paper is the claim made for Handy Sander because you simply advance the sandpaper and tear off the used portion. Tool, which is sold through hardware stores, is priced at \$2.15; refill rolls sell for 49 cents each. Carborundum, Box 477, Niagara Falls, N.Y. 14302.

LIGHTWEIGHT SANDER features dual-action—orbital or straight line—sanding that delivers 4000 orbits or straight-line strokes per minute. Powered by a $\frac{1}{2}$ -hp, 2.6-amp. universal motor, it's double-insulated with a bright red housing. Wen Products, Inc., 5810 Northwest Highway, Chicago, Ill. 60631.





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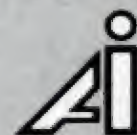
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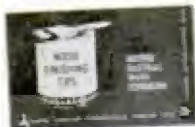
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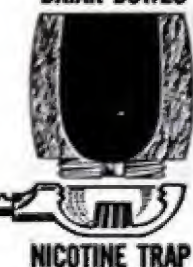
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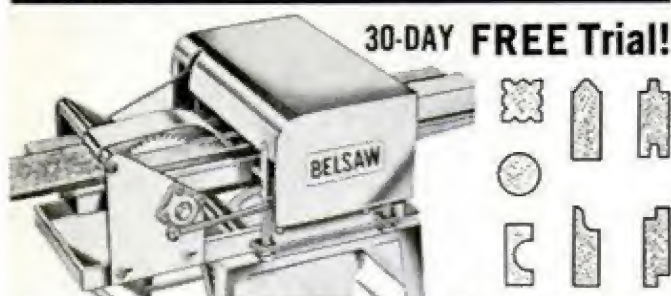
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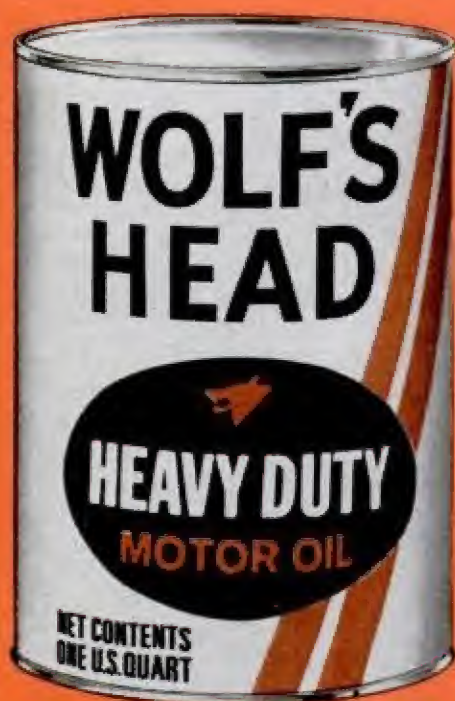
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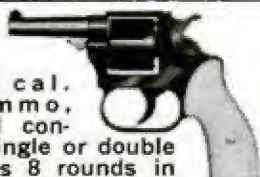
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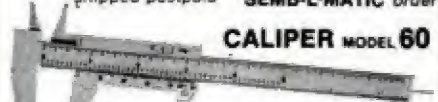
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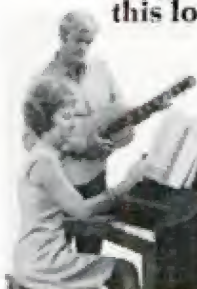
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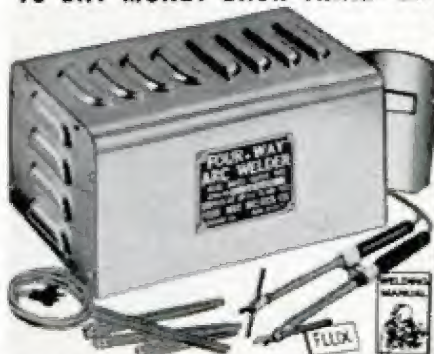
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AUTOMOBILE CLINIC

BY MORT SCHULTZ

Nonlead gas vs. timing

I never had trouble running my 1969 Pontiac, 350-cu.-in. engine, on regular gasoline with specified 9° BTDC timing. Now I've switched to a no-lead fuel and the engine pings like mad. What correction in timing should I make?—Al Tomala, Joliet, Ill.

None. You might possibly get the ping out of the engine by readjusting the timing, but your engine will act like it has a lead foot. No power. No-lead gasoline (91-octane) was developed for the 1971 models and those to come that are designed to handle the low octane rating. I suggest you try a low-lead gasoline (approximately 94 octane). If this doesn't work, switch back to leaded regular fuel, which has an octane rating of anywhere from about 94 to 96, or use a premium unleaded fuel.

More on wagon wheeling

Take it from a woman—the only way that Charles Forman will keep the rear end of his 1967 Plymouth from swinging (Auto Clinic, page 36, Nov. '70 PM) is by adding a sway bar. He can get one from the J.C. Whitney Co. in Chicago. I speak from experience. This stabilizer bar is the only thing that's keeping my 1968 wagon on the road.—Margaret W. Greene, Bellport, N.Y.

If all else fails, it's worth a try.

Balancing act

An auto serviceman told me that after rotating tires, the wheels should be balanced all over again. Is this true?—Mike Bisto, Madison, Ill.

Not only true, but also good advice. Correct balance is obtained by balancing the wheel, tire and brake drum as a unit. Assuming that the wheel and tire are balanced, once you put them on a different drum, balance is usually off.

Rear-suspension checkout

My 1968 XR7-G Cougar recently developed a creaking, cracking sound that seems like a bottoming sound, especially when someone is riding in the back. Re-

placing the heavy-duty shocks hasn't helped. What should I do now?—Ken Brandt, Burbank, Calif.

Make sure the spring clips (U-bolts) which keep the springs fastened to the axle housing aren't loose or damaged. Then, check for worn spring pads that are supposed to prevent bottoming of the rear axle against the springs. Now, check those leaf springs, paying particular attention to the rear shackles. In other words, Ken, there's more to that rear suspension than just shock absorbers.

Chokes up in the clutch

The clutch of my 1965 MGB is acting strangely. Normally, it engages when the pedal is about halfway up. However, if I hold the pedal to the floor, such as at a stoplight, it will engage closer and closer to the floor, depending upon how long I keep it disengaged. Clutch fluid is at the correct level, so I'm at a loss to explain what's causing this. Can you help?—Ray Huist, Dayton, Ohio.


Naturally, if the fluid of this hydraulic clutch wasn't up to level, you would suspect a fluid leak. No, I'm not double-talking. Loss of fluid signifies an external fluid leak. But the cause of your problem is a fluid leak right in the clutch master cylinder itself. Fluid is leaking past bad seals and is returning to the reservoir. Rebuild or replace the master cylinder, whichever is less expensive in your area.

Hesitation waltz

I and several other people with the same model car (a 1966 Oldsmobile Delta 88) have a hesitation problem that occurs between start and full warmup. When you step on the accelerator, the engine dies way down and almost stops. I've installed new sparkplugs, had the carburetor adjusted and readjusted, new valves installed, the fuel pump tested, and the heat-riser valve serviced. What now?—Elmer Denis, Green Bay, Wis.

If your car is like others, the trouble is a worn or shrunk accelerator pump cup. However, trying to put your finger on it

(Please turn to page 48)



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AUTOMOBILE CLINIC

(Continued from page 46F)

is tough. The condition disappears when the car is warm, because heat causes the pump cup to expand. Take it from me, though—have the new accelerator pump installed. This is the one that Oldsmobile issued to the field when it was discovered that the original pump was failing. If your car is a '65, '66 or '67 Olds with 330-cu.-in. two-barrel engine, use pump assembly 7026052. If the engine is a '65, '66 or '67 425-cu.-in. two barrel job, use pump assembly 7026058. Set the pump assembly for a 1-inch stroke.

Ice cold

I'm unable to get heat from the heater of my 1966 Ford Custom with 289-cu.-in. engine. I've had the core cleaned and blown, heater hoses replaced, including the bypass hose, and a new thermostat installed. The dealer now suggests a new heater core. Do you agree?—J.A. Cockburn, Halifax, N.S., Canada.

Yes. Once a heater core gets plugged, cleaning seldom does any good.

A gasser

I have a 1968 Buick Skylark sedan. My problem (no one believes it) is gasoline that leaks from an air-vent hose in the gas tank every time I apply the brakes. I went to a Buick dealer, but he didn't understand the problem. I went to numerous gas stations, but they all looked at me queerly. I'm hoping you can help me.—Charles Cherotte, Commack, N.Y.

The 1968 Buick Skylark fuel-tank vent system is a dual setup that uses two vents, both of which emerge from the tank in the right upper-front corner. One vent is open inside the tank at the upper right corner, and the other vent crosses through the tank and vents the left upper rear corner. To prevent fuel from sloshing out of the right front corner, a foam-type restrictor is inserted in the hose. This part has undoubtedly gone bad in your car—that's why you're losing gas. Just tell the service man to replace the restrictor with a new one (part No. 398339). This should take care of the problem.

Stop advancing

I recently rebuilt the engine of my 1965 Corvair Monza, removing the distributor in the process. In reassembling the engine, I found that I can't time it properly. In fact, for the way in which the distributor is now installed, a timing light shows the mark to be 90° to the right of TDC. I didn't disassemble the block, so the camshaft and crankshaft are still in their original settings. The trouble must be with the distributor, so how do I get it back into the engine properly?—J.S. Wojnarowicz, Agawam, Mass.

No—it's not the distributor. In rebuilding the engine you no doubt removed the harmonic balancer with a puller that you shouldn't have used. This balancer has a rubber inset. If it is pulled off the wrong way, the balancer will slip and the result will be the timing shift you're experiencing. I suggest that you get a new harmonic balancer for your car. There is no way to repair the old one.

Service Tips

● **1971 Dodge owners:** The light-bulb numbers shown for side marker lights in your 1971 Coronet-Charger operator's manual may be incorrect. The correct bulb number for sedans is 194 for both front and rear lights. Correct bulb numbers for the Suburban model are 194 for the front lights and 1893 for the rear lights.

● **Chevy stick shifts:** If the Inland four-speed shift assembly is difficult to get into reverse gear, give the shift lever a firm, quick snap to the left to overcome the reverse inhibitor detent and to assure proper engagement of reverse gear. Too many complaints have been heard that the unit is defective because of the effort required to overcome the inhibitor. Actually, the unit is operating as it should if effort is needed to engage the inhibitor, which is there to prevent an accidental selection of the reverse gear as you shift through the forward ranges.

● **Some 1971 Cougar owners** have been noticing water leaking into the luggage compartment and also in through the quarter-window area. If you're having these problems have your dealer follow the procedure outlined on page 3 of service bulletin 7 (11/9/70) on how to fix them. ★★ ★

GOT A PROBLEM WITH YOUR CAR? Ask Mort about it. Send your question to Auto Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. Letters cannot be answered individually, but problems of general interest will be published in the column.

Cut any lawn job down to size with a Bolens Husky.



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Now there's a Bolens Husky for every lawn and every budget. For smaller lawns, 5, 6 and 8 hp Husky "Pups"...lawn tractors with year 'round versatility. For bigger jobs, Huskys come with 8, 10, 12, and industrial strength 14 and 18 hp engines.

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One last word about Bolens Huskys. They're built by the company who introduced the first power-driven garden tractor over 50 years ago. And Bolens has been improving the breed every year since. See the best at your Bolens Husky dealer. He's in the yellow pages.

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ON-THE-GO

CAMPING

BY V. LEE OERTLE

NEW TRAVEL TRAILERS CONCEAL PROPANE BOTTLES. At long last, an imaginative designer has built a special front-recess compartment for those ugly tanks (called "bottles" in the trade). The smooth front of the hidden location makes the new Travel-master Royale the best looking new trailer in years. For two decades we've wondered why trailer makers didn't conceal the propane tanks. The same model features streamlined bus-type sliding windows, radiused corners, built-in *escape hatch* in the roof, even independent torsion arm suspension.

WARNING SIGNALS! An ex-salesman for a national campground franchising system (which folded) cautions that anyone planning to invest in a campground franchise should *first* contact at least five operators in the same franchise system. He'd ask each of them if they are satisfied with their franchise situation, also inquire about area protection, percentage of occupancy during the first two years, and whether the franchiser will listen to reasonable complaints from the individual operators. Negative replies should serve as a warning, he says, so *investigate personally!*

SHOP YOUR RV FINANCING THIS SEASON! That's the word from experts in financial institutions who say this year's break in loan rates signifies widely divergent policies even within small geographical areas. You may find one or two points difference in the same city, for example, on rates quoted for a new RV loan. On a \$10,000 purchase that's a difference of several dollars a month. Enough to make it worthwhile to shop around for the best deal? You bet!

A MILLION CAMPERS EVERY NIGHT? That's what Holiday Inns claims as a figure for American campers. Somewhere and everywhere 213 *million person-nights* were spent in tents, RVs, cabins or boats last year. The campers spent \$83 billion (that's *billion*) in pursuit of outdoor recreation. Campers freshly back from Yellowstone, Grand Teton, Yosemite and other national parks would probably swear that 900,000 of each million were trying to get into their particular campground each night!

CAMPERS CONTINUE TO BE INJURED BY BARBECUE HABITS, as campground operators and park rangers warn of these potential hazards in barbecuing with braziers or open-fire methods. First, never place a sealed can of food in hot coals without puncturing or removing the lid first. Otherwise, steam heat eventually will explode the can and send jagged fragments flying. Second, don't use gasoline to start charcoal briquets afire inside cramped quarters of a tent or coach. Use slow-fire products only. Third, don't use charcoal for heat inside a closed coach—fumes are deadly. Literally, fatal!

WHY PARK PLANNERS GET ULCERS! The annual bill for litter clean-up in a typical tourist state runs \$500,000 in state parks alone. Repairs to facilities damaged by vandalism run from \$50,000 up. Rising labor costs and a *fixed fee schedule* have placed many state park departments heavily in red ink. Look for increases in overnight fees in many busy Western states this season. California, for example, is raising per-night prices for campsites with full hook-ups to \$4, for developed campsites to \$3 and for undeveloped sites to \$1.50.

TOLL RATES HAVE BEEN CUT ON THE NEW YORK THRUWAY for cars and light trucks hauling a two-axle trailer. A revised rate schedule calls for vehicle combinations to be charged a basic toll of 3.1 cents, rather than the 4.25 cents previously charged. (Without a trailer, a light truck or other two-axle, four-tire vehicle travels at the same rate as a passenger car.)

★★★

CAR OF THE YEAR.

Motor Trend magazine has named the Chevy Vega its 1971 Car of the Year.

Naturally, we're pretty happy about it. Because this is obviously the year of the little car in the big automotive world. And while there are lots of little cars that could have been Car of the Year, only one is. Ours.

Here's another reason we're happy. We've been saying for months now that Vega is the little car that does everything well. Lucky for us, lots of you took our word for it and bought a Vega. Our thanks.

As for the rest of you, you not only have our word for it, you have Motor Trend's: "For the money, no

other American car can deliver more." Vega. It's a lot of little car.

- ☐ I'm interested. Please send me some literature on the Vega.
- ☐ I'm very interested. Please send me literature and contact me for a Vega test-drive.
- ☐ I'm so interested that I already bought a Vega. Please send me a Car of the Year sticker for my car window.

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Falling objects



Lightning



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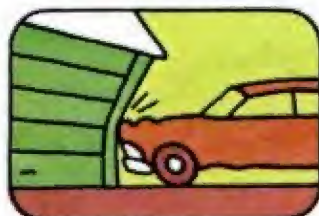
Hail



Explosion



Smoke damage



Damage from vehicles



Damage from aircraft



Living expenses



Vandalism



Robbery

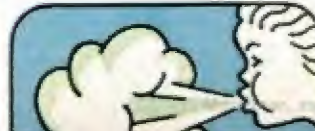


Fire on contents

Allstate
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Court costs



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UNIVERSITY PARK, PA.—Benomyl, a commercial fungicide best known for its ability to intensify greenness of leaves and to delay the aging of certain plants, has recently been found most effective in protecting plants from the harmful effects of ozone. Prolonged exposure to ozone (from auto exhaust among other sources) cripples a plant by first speckling its leaves white. The specks darken and spread; the leaves burn out and eventually the plant dies. But when benomyl is added to the soil, Penn State's researchers claim, the plant is protected against ozone for at least 10 days from application. And considering that the ornamental plant industries contribute approximately half a billion dollars to the gross national product, a compound such as benomyl becomes even more valuable.

BRIDGEPORT, TEX.—You can't bury an old rubber tire because it works its way back to the surface and you can't burn it because it pollutes the air. But, recently, old rubber tires have been shredded and used in road building as a resilient, cushioning layer between soil and concrete. Normally, sand and gravel serve as a cushion, but this layer is readily saturated by water and induces internal sweating and surface cracking of the road. A proper mixture of finely shredded (1-mil dia.) and coarsely shredded ($\frac{1}{4}$ -inch dia.) rubber, however, is not readily saturated by water and so stretches the life of the road. Fine rubber particles used alone in road building are impractical; workers inhale them and particles are blown by the wind. And large rubber particles alone are also impractical; they allow water to flow between them and up to the concrete. The rubber in the cushion, according to the Cush Crete Co. (Box 638, Bridgeport, Tex., 76026), will not break apart and mix with soil, thus adding to road endurance. In addition, the rubber cushion provides enough resiliency to withstand expansion and contraction of the sub-base, earth tremors and sonic booms.

RICHMOND, CALIF.—An oil-on-water detector, sensitive to 5 or 6 drops of oil in a stream, has been designed by the Shell Development Corp. The detector, mounted between two 8-foot-long pontoons and moored in a refinery-discharge stream, sends a beam of light onto the water's surface to scan for oil. Light is then reflected back from the water and into a photocell. If the intensity of light increases 50 to 100 percent, an alarm is triggered to indicate the presence of an oil slick. The contaminated water is then quickly diverted to a holding pond until the main stream is clear of oil. This detector operates day and night and in fog.

DO YOU KNOW about some action being taken to fight pollution that we don't know about? In your community? On the job? Tell us about it. Write Environment Editor, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019.

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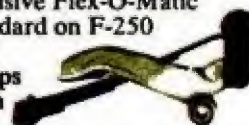
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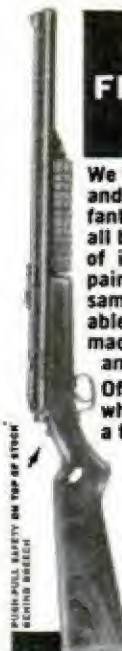
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HOMEOWNERS' CLINIC

BY W. CLYDE LAMMEY

Garage floor sweats

My attached garage floor sweats in winter, spring and fall whenever the temperature rises from a lower reading. There are small children in the neighborhood and I keep the door closed. Why does the concrete floor sweat? Is there any remedy? —L.R., Mich.

Condensate forms because the floor surface is at a lower temperature than the air with which it is in contact—the reason that beads of moisture form on a tumbler containing cold water on a warm summer day. For the simplest remedy, keep the doors open until the temperature equalizes and the water on the floor evaporates. In your case, raise the large door a foot or so and block it so it can't be fully opened; crack the other door, if any, a few inches and block it likewise. Do this each time the temperature rises appreciably.

You could also install louvers in the lower door panels. Remove the lower panels in each door and substitute framed louvers made in your home shop or custom-made at a local millwork plant. These provide constant air circulation.

Cleaning fireplace flue

I think my fireplace flue needs cleaning, but how? The chimney is about 25 ft. high and so far as I know has never been cleaned of the sooty coating at the top. Also, is it true there's a downdraft in the flue at all times? If so, what prevents the fireplace from smoking? —C.A., Ill.

If you burn resinous woods or fireplace coals, the flue is probably coated with the sticky, resinous material mixed with soot. The former is difficult to remove, the soot less so. If you use the "cleaner" woods exclusively, the flue may not need cleaning. But dust and debris collect in time on the sides of the flue and on the "wind shelf." The latter, just above the damper in a properly built fire opening, will probably need cleaning to maintain its efficiency.

To clean the flue, pack a cloth bag with straw or similar resilient material and weight it with a brick or two. Tie a long cord to the bag and lower bag into the flue. It should just fit so that as you lower and raise it all sides of the flue will be scrubbed thoroughly. Keep the fireplace

opening covered while doing this. Then open the damper, reach up inside the opening and remove the accumulation from the shelf.

There is always an up-and-down draft in the chimney. When the house is closed this equalizes the air pressure. The shelf turns a good portion of the downdraft back into the updraft and thus prevents the smoke from being blown into the room.

Seeding after tree removal

The city removed a diseased elm tree from my curb early in spring and the stump was shredded. I removed shreds, then lifted and leveled the sod about the stump. I put about 4 in. of black soil in the hole, mixed in fertilizer and seeded the area. But the seeding, even with regular watering, is yellowish colored, appears stunted and looks as if it may die out. What's wrong? —S.H., Ill.

Perhaps you did not remove all shavings or shreds. This usually is necessary when you seed immediately after tree removal. Refill the hole a little over-full with fresh, new soil mixed with an organic fertilizer, such as sheep or cattle manure, and tamp lightly with the garden rake to pulverize all lumps. Make sure the surface soil, especially, is uniformly fine. Then spread seed evenly (not too heavily) over the surface with the fingers and pat it in with the palm of your hand. Don't rake seed in; this tends to bunch it, leaving bare spaces. Cover with an even, rather open layer of wheat straw or burlap, then ring the seeded area with white stakes and cord or light chain to warn passersby not to walk over the new seeding. Sprinkle the area at regular intervals using a fine spray and sufficient water to soak the soil to a depth of 5 or 6 in. Pull out any weeds that appear and don't use your mower until the new seeding is 1½ to 2 in. high.

Rare 'find' in attic

While cleaning the attic of an old home I recently occupied, I found an odd-looking hook, apparently a brass casting shaped like a dolphin with the tail and part of the body turned up to form the hook. What looks like a lagscrew extends about 3½ in. from the mouth. Can you tell me what it is, and what it's for? —P.N., Me.

Judging from your description, you've made a rather rare find. I'm guessing it's what was known as a "jamb hook." The lagscrew end was turned into a hole in the mortar between bricks of a huge colonial fireplace to hold fire-tending tools. ★★

Taste too hot to handle?



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the way
up to
KOOL

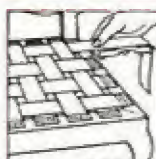
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Making Bourbon which tastes good, bottle after bottle, made Old Crow famous. Back in 1835, our people figured out the formula that took Bourbon-making out of the hit-or-miss category. Later, they handmade the first sour mash Bourbon. We still use our hands in making Old Crow.

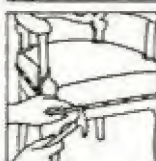
After work, most of our men keep on using their hands. Jerry Simpson calls on the same craftsmanship maintaining the quality of our country Bourbon as he does upholstering this chair. For a set of upholstering plans write: Old Crow, Box 675, Frankfort, Kentucky 40601.



Stretch webbing tightly to chair frame. Interlace.



Cover with burlap, stuff with sisal. Eliminate lumps, hollows.



Cover stuffing with muslin, then with fabric.

Old Crow

Made by good Kentucky hands



KENTUCKY STRAIGHT BOURBON WHISKEY, 86 PROOF. DISTILLED AND BOTTLED BY THE FAMOUS OLD CROW DISTILLERY CO., FRANKFORT, KY.

Thousands of 'little guy' owner-drivers—some fleets too—are playing bad-brake, bald-tire bingo. In a 25-ton rattletrap it's a lethal game.

Unsafe Trucks Can Kill You!

By FRANK A. TINKER

A PRIME-TIME TV ADVERTISEMENT lauds the safe practices of American truckers. Trucking circles themselves boast that their drivers suffer only half as many serious accidents as the average motorist. But before that average driver, whose car passes within a few feet of speeding 25-ton trucking rigs many times each driving hour, accepts the claims of this mutual admiration society he might consider this: A recent spot check on a major interstate highway showed that *one of every seven trucks was "imminently hazardous to public safety"* and was put out of service by state authorities!

Lest this be considered an exception, a follow-up check at the same Arizona point only a few months later resulted in the same dismal statistics. Of 2881 units examined (a tractor and trailer count as two units), 451 received written

What Arizona inspectors check and find on "gypsy" trucking rigs

AIR HOSES WORN THROUGH TO TWO-PLY

PHYSICALLY DISQUALIFIED DRIVERS
(e.g., GUILTY OF OVERTIME DRIVING,
RELYING ON AMPHETAMINES)

INOPERATIVE LOW-AIR WARNING
DEVICE AND EMERGENCY BRAKES

CRACKED FIFTH WHEEL

TIRES WORN THROUGH
SEVERAL FABRIC PLIES

LEAKING FUEL TANKS

notice of safety violations. Yet this raised no eyebrows in highway safety enforcement offices, where shoddy equipment and hazardous driving practices by some truckers are accepted as normal rather than surprising.

These figures were so contradictory to the common impression of a safety-conscious trucking community, however, that an on-the-spot observation of such an inspection seemed in order. Within a few hours of his request, this *PM* correspondent was parked along Interstate 10 just outside Tucson with Sgt. Mike Kramer of the Arizona Corporation Commission.

"Now that's a big interstate line car-

rier," Kramer commented as one rig roared past. "Those are usually clean—less than 10 percent of our violations go to them. There's a welding company truck from out of state, carrying lumber. Let's just check."

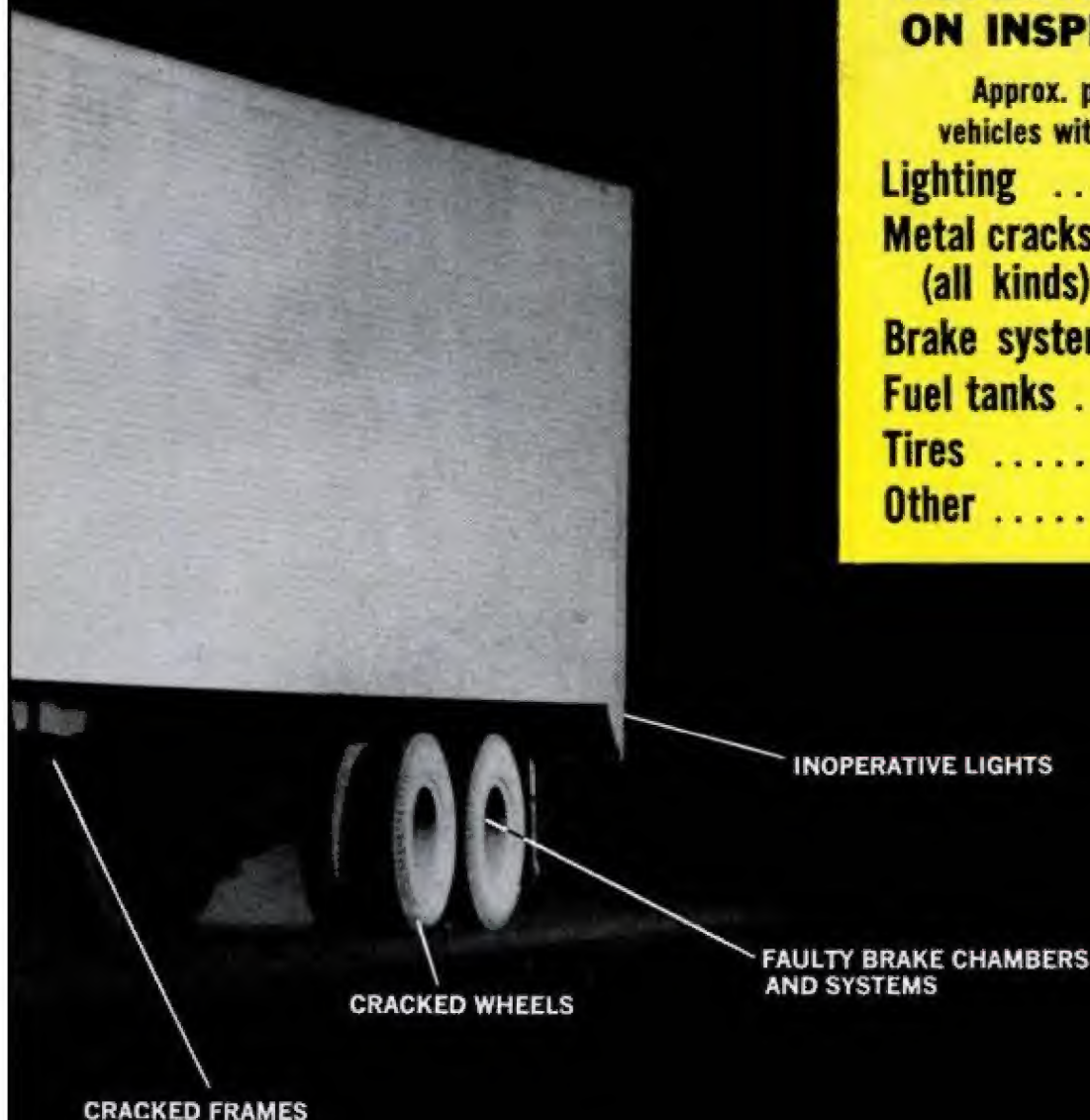
Our blinking red lights signaled the semi rig to the roadside. The driver, an affable and forthright part owner of the truck, didn't even pretend to be legal. "I'm sorry," he admitted at Sgt. Kramer's first request. "I just don't have a trip log or medical certificate."

The truck had more than 20 serious defects, including tires cracked and worn, a fractured "fifth wheel" (the large swivel plate between tractor and

MOST COMMON DEFECTS FOUND ON INSPECTION

Approx. percent of vehicles with the defect

Lighting	75
Metal cracks (all kinds)	30
Brake systems	22
Fuel tanks	4
Tires	15
Other	15



trailer, the failure of which can send the rig whipping out of control), air hoses that are worn to the cord in spots, and no brakes at all on the front wheels.

The truck was placarded as being "out of service" and led to a repair station. Here the driver conceded that he had been given a fair shake; this was no "trick" inspection.

"This is nothing unusual," Sgt. Kramer shrugged as we left. "A significant percentage of these heavy rigs on the road are simply unsafe. This particular driver was a cut above the average. Some have been on duty beyond any reasonable or legal limit and

are trying to stay awake by gobbling caffeine or 'speed'."

No more evidence was needed to show that someone's statistics on trucking safety are misleading indeed. But, as Mike Kramer pointed out, most such figures deal only with those companies belonging to the American Trucking Assn., the large line carriers which are regulated by federal agencies and recognized as being the most conscientious in the business. Most have full-time safety directors and union-driver contracts which help to prevent common abuses in overtime driving and defective equipment.

There is no exact way of estimating



ROADSIDE INSPECTION of owner-driver's rig is made by Sgt. Mike Kramer in Arizona. The fifth wheel is carefully checked



CRACKED WHEELS and tires worn through several plies are often found by Kramer

just what percent of the total trucking load on our highways is hauled by these better companies. Federal (Interstate Commerce Commission) regulations apply to those licensed for interstate transport of "common carriage" goods. But it is known that a probable *majority* of the nation's highway freight is moved by companies either not primarily in the trucking business themselves or by smaller, uncertificated, "gypsy" outfits whose character or budget results in such startling violation figures as those garnered by Arizona authorities.

Many companies have their own trucking fleets. Some are large, well-maintained operations. Others are much smaller and more haphazard, some consisting of single trucks owned or leased by the driver. Some operate only within a particular state and thus need no certification; still others are exempt from regulation by reason of the goods they carry.

For example, trucks carrying farm produce are exempt from federal tariff regulation and manage to escape most state inspections. These and heavy construction vehicles are even exempt from many minimum-speed laws, wide-load regulations, or those requiring lights. Certificated interstate trucks must charge the minimum ICC rates; the gypsy is supposed to be carrying

goods exempted from these regulations. But some choose to ignore these laws and carry regulated commodities at lower rates. They find it easy to enlist customers willing to buy cut-rate service or take kickbacks. A cut-throat competition thrives and, like aviation, trucking is the kind of business in which safety must inevitably suffer when rates are driven too low.

The gypsy, sometimes carrying freight in open violation of ICC rate regulations, has but one concern: to get his cargo to its destination as quickly and cheaply as possible, regardless of any risk this may involve. And, amazingly, such truckers often obtain their loads from reputable manufacturers, forwarders and even government sources.

"One flooring manufacturer," commented Mike Kramer, "right now is contracting just as fast as it can with any gypsy who wants to take a crack at getting a hot load to the West Coast. They both know they're well outside the law but they figure the low rates and the profit are worth the risk—or the fines if they aren't caught too often. We know of at least one company even offering a bonus to drivers who can make it with a hot load across Arizona without being nabbed."

Why Arizona? This is a "bridge" state between eastern sources and

large California markets or warehouses. Some 3000 commercial vehicles a day traverse Interstate 10, the all-season thoroughfare which crosses the state. And Arizona, along with approximately 18 other states, has made a serious attempt to put teeth into its trucking regulations. Whereas most concerned states must rely upon their already overworked highway patrols to inspect truckers, Arizona has given this job to a small, elite corps of specialized enforcement officers working under its Corporation Commission. These men are familiar with trucking, some having graduated from its dubious academy, and have made a name for themselves in this field.

Many states are interested mainly in collecting the fees for trucks using their highways. Rigs stopping to pay tolls at their "inspection" stations are rarely checked except for weight and obvious defects such as missing lights. One superintendent of such a state's highway program has even barred safety inspectors from these stations, for fear their "harassment" might cause truckers to bypass the state.

The trucking underworld as seen through the eyes of a conscientious veteran such as Mike Kramer is a disturbing one. "Take the driver who is buying one of these rigs with the company which then leases it and furnishes many of his loads underwriting the deal—a common arrangement," he explains. "The tractor may cost \$15,000 to \$20,000 and he has to meet the high monthly payments in addition to maintenance, insurance and operational costs. Many such drivers wind up making barely enough to pay expenses. One told me that he had figured he was working for about two and a half bucks an hour, and taking all the grief and risk along with it. One major repair or one long delay and he was out of business."

Such a driver, or gypsy company, saves costs by whatever means possible. Proper maintenance is the first to suffer; the driver himself is not far

behind. Each truck jockey is required to carry a log book, showing the time he spends driving *or on duty in other capacities*. Since overtime driving is common, *two* logs are often kept, one showing safe and legal time for the average inspector's eyes, the other showing actual time for pay purposes.

"The legal limit in most cases is 10 hours of driving, then at least eight hours rest," said Sgt. Kramer. "But we've picked up drivers who have been on duty for several *days* without any real rest. And almost every accident we investigate involves overtime driving."

If trip logs look suspicious, Kramer and his crew of road sleuths scan the fuel receipts of a trucker. Since these receipts are dated and give the loca-

A LETTER MAY SAVE YOUR LIFE

If you're in favor of tougher state and federal regulation of uncertificated "gypsy" trucking outfits—including more federal inspectors—send Popular Mechanics a postcard or letter. We won't be able to acknowledge your correspondence, but we'll see that your letter gets to the right man in Washington. Write: Safer Trucks, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019.

tion of the sale, a savvy inspector can tell immediately just how long the driver has been on the road. Calls to home offices inquiring about such duty time may be futile, since some employers actually endorse, or at least tolerate, overtime driving. Whatever one may think about the political affiliations of trucking unions and their history of corrupt leadership, such union affiliation often provides the security which enables drivers to refuse unsafe equipment and hazardous overtime duty.

An alarming percentage of gypsy trucks in Arizona are driven by men who are weary, their reflexes dulled, their burning eyes propped open by caffeine pills or worse. When the caffeine pills available at every roadside restaurant are no longer effective,

(Please turn to page 178)

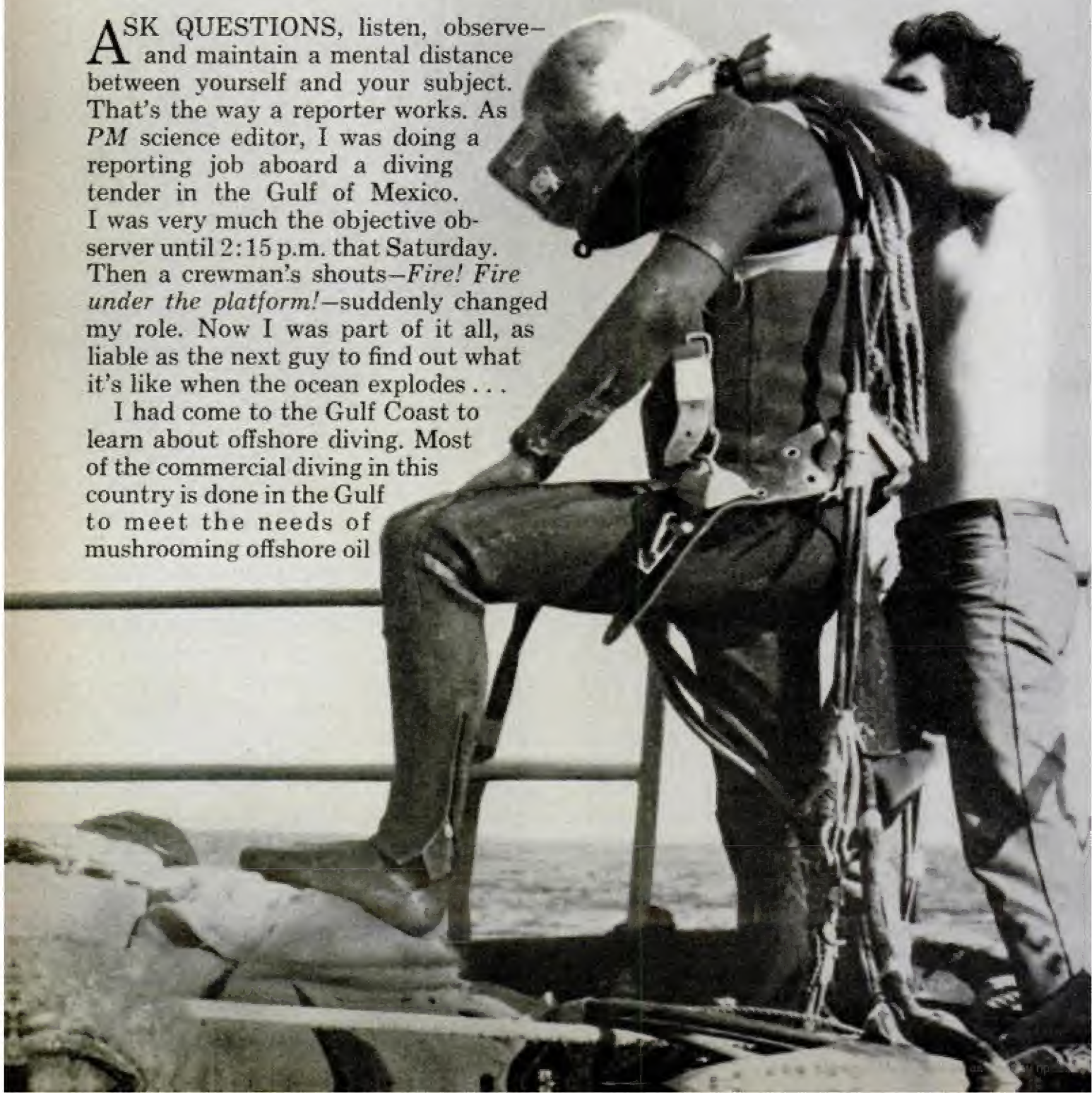
Rugged World of the Offshore Diver

By JOHN F. PEARSON
Science Editor
Photos by the Author

It was a routine diving job—digging trenches for gas pipes on the Gulf floor. Then, under the big production platform, flames swept across the water.

ASK QUESTIONS, listen, observe—and maintain a mental distance between yourself and your subject. That's the way a reporter works. As *PM* science editor, I was doing a reporting job aboard a diving tender in the Gulf of Mexico. I was very much the objective observer until 2:15 p.m. that Saturday. Then a crewman's shouts—*Fire! Fire under the platform!*—suddenly changed my role. Now I was part of it all, as liable as the next guy to find out what it's like when the ocean explodes...

I had come to the Gulf Coast to learn about offshore diving. Most of the commercial diving in this country is done in the Gulf to meet the needs of mushrooming offshore oil

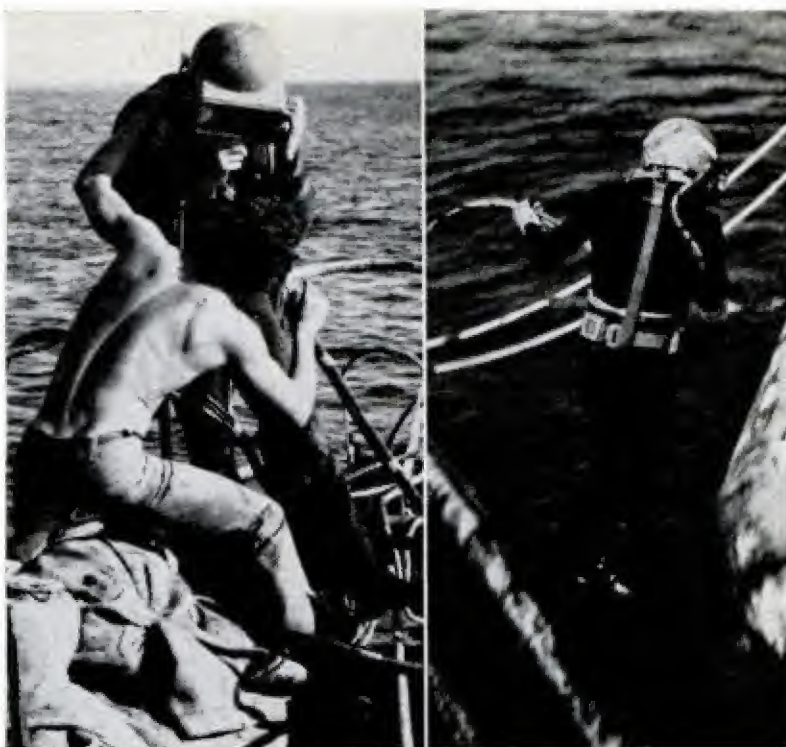


and gas industries. Good pay and plentiful work attract divers from many states and Canada.

Many of these men settle in Morgan City, La., the "diving capital of the world," a town of 13,500 strung out along Highway 90. Drop in at any of Morgan City's numerous bars and you're sure to run into guys who make a living under the sea—lusty, rugged, friendly guys who can tell you what it's like to dive in the Persian Gulf, North Sea or the coastal waters of South America. Gulf Coast diving companies take contracts in many parts of the world.

Packer Diving & Ocean Engineering, Inc., one of about a dozen companies based in Morgan City, agreed to let me go out with one of its crews. On Friday morning, Nov. 7, 1970, I climbed aboard a pickup truck with Tim Bixler, a Packer diver. Our destination: Sabine Pass, Tex., about a seven-hour drive west. There we would pick up a crew boat to take us to the job at an Atlantic Richfield Co. production platform in the Gulf.

"It's a basic job with nothing fancy



CAREFUL CHECK OF HELMET and hose (left) is made before dive. Once diver gets the word to go, it's a quick jump into the Gulf

about it," Tim explained. "A good example of what everyday diving is like."

A thoughtful, soft-spoken man of 30, Tim got interested in diving when he was a cop in Chicago. He said he had been a commercial diver for five years.

Today, he told me, most divers get started by going to one of a dozen commercial diving schools. Three months and about \$1000 later, they try to catch on as tenders. A tender is like a caddy. He looks after the diver's gear, helps

FIRE UNDER PLATFORM IS OUT, but tires on workboat still burn. Satellite tower is seen to left of platform



him suit up, makes sure that the hose, valves, diving helmet telephone and other equipment is in working order. He handles the hose from start to finish of the dive.

A year or two of tending is the best possible preparation for a career of diving. In addition to learning the basics of the craft, the tender gets a chance to make shallow dives.

"On the job you learn that diving is not an end in itself," Tim said. "You learn that it is just a way to get to and from your work. Once you're at depth, your work begins. You may have to function as a pipefitter, welder, rigger and carpenter. You have to get used to working by feel, for usually visibility is poor or nonexistent.

"Working under water is like working out in space. Because you're buoyant, it's difficult to get leverage with tools. Tightening or loosening a bolt with a horizontal motion is almost impossible—you move instead of the bolt. That's why most bolts are placed so you can tighten them with an up-and-down motion while you're standing on the bottom or have your feet braced against a horizontal support.



SUITING UP: Dick Williams (left) gets help. "Shoo" Schumacher uses cornstarch to help him ease into custom-made wet suit.

A diver has to be ready to go, day or night. He may get a call at dinner, climb aboard a company truck an hour later, ride all night to catch a crew boat that will take him to the barge from which he'll dive. Or he may be taken straight to the barge by helicopter. Then he may work for three weeks straight before returning home to wait for his next assignment. The Gulf diving season runs from about May to De-

DIVERS WORK ABOVE WATER, TOO. Packer crew moves 80-pound bags of cement mix to deck of *Blue Water*





CHUCK HIGGINS drops bag of mix from platform. On bottom, divers place bags between feeder pipes

cember; during the winter the Gulf is too rough for safe operations.

Though a diver is associated with a particular company, he gets no regular weekly salary but is paid only when he actually works. For shallow diving, about 50 feet or less, he'll earn about \$100 a day. For deep diving he may make as much as \$485 a day.

Tim smiled when I said I'd heard that many Gulf divers make as much

as \$50,000 a year. "Oh, there may be a few top guys earning that kind of money," he said, "but the majority probably make from \$15,000 to \$20,000. The hard part is socking away enough to carry you through the long off-season. It's hard to borrow money or get credit, for divers aren't considered good risks."

After reaching Port Arthur, Tex., we headed 15 miles south to Sabine Pass to catch the launch out to the Atlantic Richfield rig—Platform B, in an area of the Gulf designated as Block 24. We arrived at the boatyard at about 5:30 p.m., too late for the last crew boat.

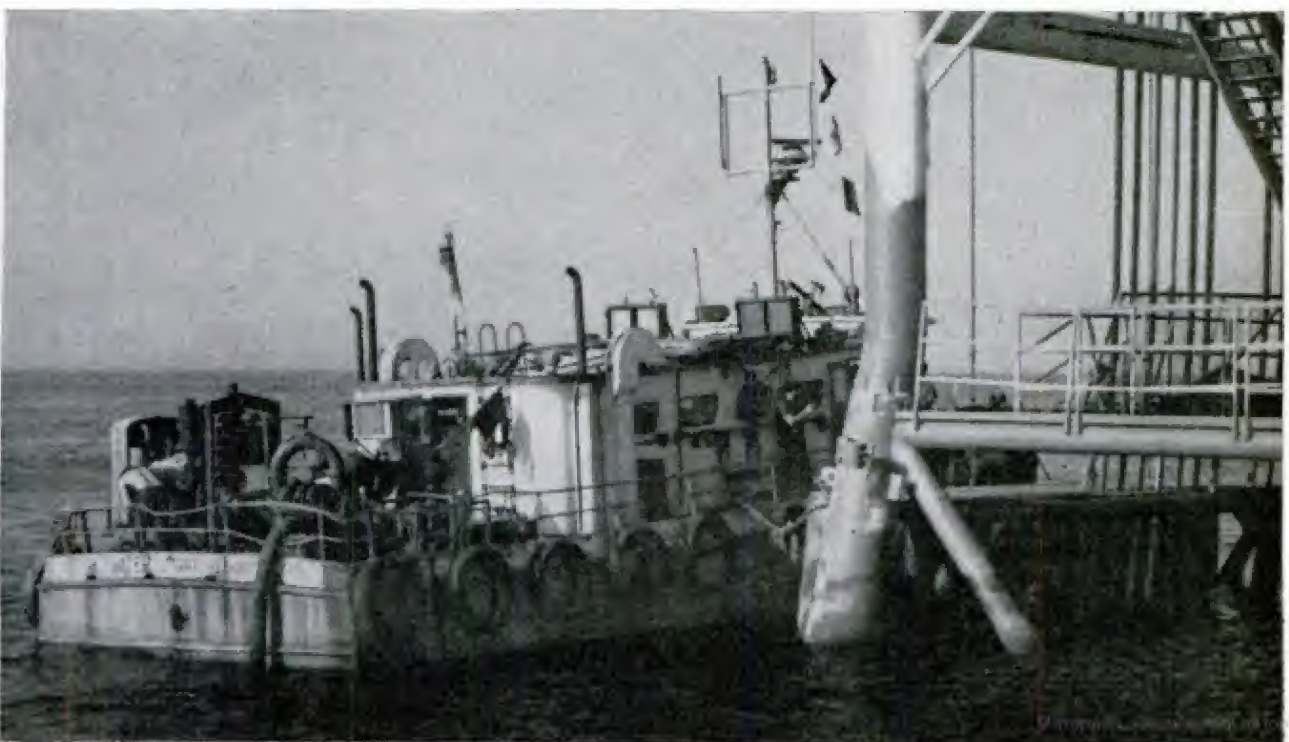
We spent the night in the only motel in the vicinity. It featured cracked walls, bare light bulbs and the most bloodthirsty mosquitoes this side of the Panama Canal.

We boarded the *Miss D*, at 7:00 a.m., joining half a dozen hard-hatted rough-necks bound for a day's work aboard Platform B. Two hours later, when we tied up at the platform, I saw another boat on the other side. It was the *Blue Water*, the Packer diving tender.

The platform towered above us. Four steel corner legs rose 50 feet above the water to support the big, square main deck with its big steel cylinders in which liquid condensate is separated from the natural gas and gas pressure

(Please turn to page 180)

CLUTTERED DIVING TENDER was tied up along Platform B when fire started. Photo was taken before blaze



When They Talk With Their Hands, What Are They Saying?

On many jobs hand signals prevent confusion and get the message across instantly. Even radio can't beat sign language—if you know the signals

By **NORMAN SKLAREWITZ**

Photos by James H. Pickerell

SIMPLE HAND SIGNALS—when the code is understood—are unmistakable. That's why they're used in Boeing's mammoth 747 plant in Everett, Wash., where several overhead crane operators respond to the signals of separate floormen. Each has a radio, but it's not used for guidance because all radios in the plant are on the same frequency. An operator might react to the wrong floorman's call.

Sign language is used where noise and distance drown the voice—construction sites and freight piers. One of the more complicated sets of hand sig-

LEAD MECHANIC at Washington National Airport eyes the cockpit of an American Airlines Jetliner and indicates he is waiting for the pilot's signal that he is ready to taxi





HOOK TENDER at Boeing's 747 plant gives signal to overhead crane operator to lift "micro" (slowly). Men have radios, but it's impractical to have separate frequencies for each operator, floorman



PILE DRIVER FOREMAN on San Francisco construction project uses this signal to tell crane operator to "hoist hook slowly." The operator's view of the hook is often obstructed. Television stage manager (below) uses a signal peculiar to the trade to warn news commentators that only half a minute is left in show



nals is used by deckmen in loading and unloading ship cargoes. The operator works separate sets of controls for two booms, one to port and the other to starboard. The deckman uses each of his hands to give separate signals for the two booms.

Another noisy environment is the airport, where parking planes still is largely a hand-signal operation. Sign language also is used where silence is necessary—in radio and television studios. Wherever it's used, this basic and to-the-point form of communication gets the job done. ★ ★ ★

LONGSHOREMAN ON DECK of ship loaded at Baltimore leans over the rail as cargo is being hoisted from the dock. He signals the boom operator to take up on right cable full speed and hold the left



Racing toothpick for speed

A one-man racing boat which is narrower, shorter and 30 percent lighter than conventional shells has achieved astonishing times. Designed by Eberhard Zohlen of West Germany, it will be followed by two, four and eight-man shells, may make an Olympic bow.



Attaché case traps motorists

Hidden in the small case is a mini-radar designed to trap unwary British drivers long accustomed to obvious, easily-spotted police radar. The inexpensive battery device has been called "a sneaky Big Brother affair" by the Royal Automobile Club.



Put your moose teeth here

Containers like this greet hunters on Alaska's Kenai Peninsula at entrance and exit points to moose-hunting grounds. The collection of moose choppers serves a good purpose: The age of the animal can be determined from a cross section of an incisor. By keeping track of ages, biologists can determine health, reproductive and survival rates, and decide how much future hunting should be allowed.



Plastic igloo for fast shelter

Two types of plastic material are sprayed together on a revolving balloon to form this instant home. After the 4-inch-thick shell has dried for an hour, windows can be set in. Developed by a German concern, the igloo will shelter disaster victims or vacationers.



Pulleys give bow added punch

Cables and pulleys help bend this bow in the middle instead of just at the ends and give it a punch said to be like an M-16. The eccentric pulleys on the tips of the bow make it progressively easier to pull, a strange sensation when compared to an ordinary bow. A bow which adjusts from 55 to 70 pounds, for example, requires 50 pounds of pull at 24 inches, but only 38 at full draw. It sends a hunting arrow 374 yards in free flight. Known as the Jennings Compound Bow, it has just been legalized for competition by the NFAA.

Biggest drydock

Currently the world's largest, this drydock at Lisbon, Portugal, now under construction, will go into full operation next month. Some idea of its huge size can be gained from the dimensions. It is over 1700 feet long and almost 300 feet wide. The new drydock was made necessary by the growing use of gigantic tankers to carry crude oil and other petroleum products. The facility can handle today's supertankers and most of those planned for the future—ships with a capacity of up to one-million tons.



Teddy bear with a heart

The electronic heartbeat of her teddy puts this little girl to sleep easily and quickly. The inspiration of Englishman Colin Masters, the built-in heart is a solenoid driven by a timing circuit which taps its metal chassis.



Coming: Color Movies From Black-and-White Film!

This remarkable new camera, developed for use with CBS's electronic video recording process, may make it possible to watch home movies on your TV screen



By SHELDON M. GALLAGER

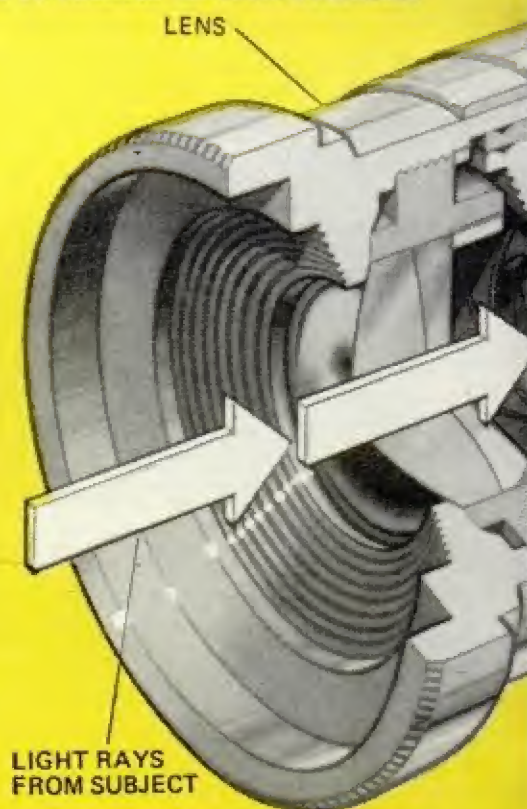
IMAGINE loading your movie camera with ordinary 8-mm black-and-white film, shooting the family at the beach, then watching the pictures in full color on your TV screen. This startling possibility is the promise of a new camera recently patented by CBS's electronic wizard, Dr. Peter C. Goldmark, and his assistant, William E. Glenn Jr.

The magic transformation from black-and-white to color is based on CBS's electronic video recording process (EVR), also invented by Dr. Goldmark and already in use for recording play-at-home TV programs (see *Big Boom in Cartridge TV*, page 76, Jan.

PM). In this system, color images are electronically recorded on black-and-white film in the form of coded patterns. When the film is run through a small EVR player attached to a color TV set, the coded patterns are scanned electronically and reconverted into color images on the TV screen. One shortcoming of the system is that, until now, it has not permitted home recording—you're limited to factory-produced films. With the new camera, however, this objection would no longer exist. You could shoot home movies on inexpensive black-and-white stock and view them in color with any EVR player.

The camera is similar to conventional

EVR PLAYER shows color movies on TV from black-and-white film. At left is actual sample of split-image film enlarged four times



CODED IMAGE CONSISTS OF BARS REPRESENTING COLORS IN ORIGINAL IMAGE

MULTI-FACETED LENTICULAR LENS BREAKS COLORED BANDS INTO MANY NARROW BARS

PRISM REFLECTS COLORED BANDS ONTO FILM

SOME LIGHT PASSES THROUGH FILTERS TO FORM CONVENTIONAL IMAGE IN BLACK-AND-WHITE

ANGLED DICHOIC FILTERS SPLIT IMAGE INTO RED, BLUE AND GREEN BANDS



ARRANGEMENT OF DICHOIC FILTERS

Technical Art by Peter Trojan

types except for one added element between the lens and film. This is a beam splitter consisting of a series of colored dichroic filters and a prism. The filters are arranged in narrow bands of red, blue and green—the three colors that make up the color image in a TV tube. It is a characteristic of dichroic filters that each reflects light of only one color or frequency, allowing the rest to pass through. Thus the red filter reflects red, the blue, blue and the green, green.

Instead of one image on the film, the beam splitter produces two side by side. Light passing through the filters creates a conventional image in black-and-white along one edge of the film. The colored bands of light reflected by the filters are channeled by the prism to the opposite edge of the film. The bottom of the prism facing the film has a multifaceted, toothlike surface forming a series of tiny lenticular lenses. These break the colored bands into still-narrower bars of light. The bars are recorded on the film in tones of gray according to the frequency of each color. Where there's red in the original scene, there are bars representing red. The same is true for blue and green. Where a color is not present in the scene, no bars appear. Thus the bars form a coded image in black-and-white representing the colors in the subject.

In playback, the process is reversed. The film is scanned and the bars generate color signals according to the frequencies of the original colors. These are electronically superimposed on the visual image to get a full-color picture on a TV screen. Sound can be added just as with regular EVR recordings.

By setting the camera for single-frame exposure, you can take still pictures one at a time and show them on TV like slides. Conventional movie images aren't sharp enough to be blown up and viewed as stills, but this isn't a problem with EVR because the process is electronic rather than optical. With a standard 50-foot reel of film, you could take over 3000 separate pictures! ★★

NEWS BRIEFS



Renault R 17

Renault's new R 17, a two-door sports coupe, uses the same 90-hp engine that drove the Alpine Renault to a victory in the Monte Carlo rally. Renault expects to have the car in production late this year.



New air-cushion vehicle

Powered by two 180-hp Lycoming engines that supply lift and thrust, Australia's Hovergem G6 has shown in tests that it's an ideal vehicle for use on coastal marshlands. It can travel as fast as 80 mph.



Ultrasonic caliper

Using ultrasonic waves and a pulse-echo technique similar to sonar, the Branson Caliper 101 enables engineers to take thickness measurements of wing panels and airframes with an accuracy of 1/10,000th inch.



Dry-land sailing

Sailors can get lots of experience on a small boat before they ever venture near blue water by taking lessons in a computer-operated sailing trainer that simulates all kinds of wind and sea conditions. The novice inserts one of 60 different lesson charts into the teaching machine (photo above), pushes a button and from then on, he's in charge of a computer-controlled sailboat. A pen traces his actions on a chart nearby, giving him a record to study at his leisure.



Giant for Alaska

Too big for any highway, Kenworth Truck's 953-S (for Super) hauls 125 tons over icy roads between Fairbanks and North Slope oil fields. A 12-cylinder, 475-hp diesel drives the S-truck at 45 mph through an 8-speed automatic transmission. Tires are 28-ply, 6 feet in diameter. It travels the 800-mile round trip without refueling in temperatures as low as minus 70°F.

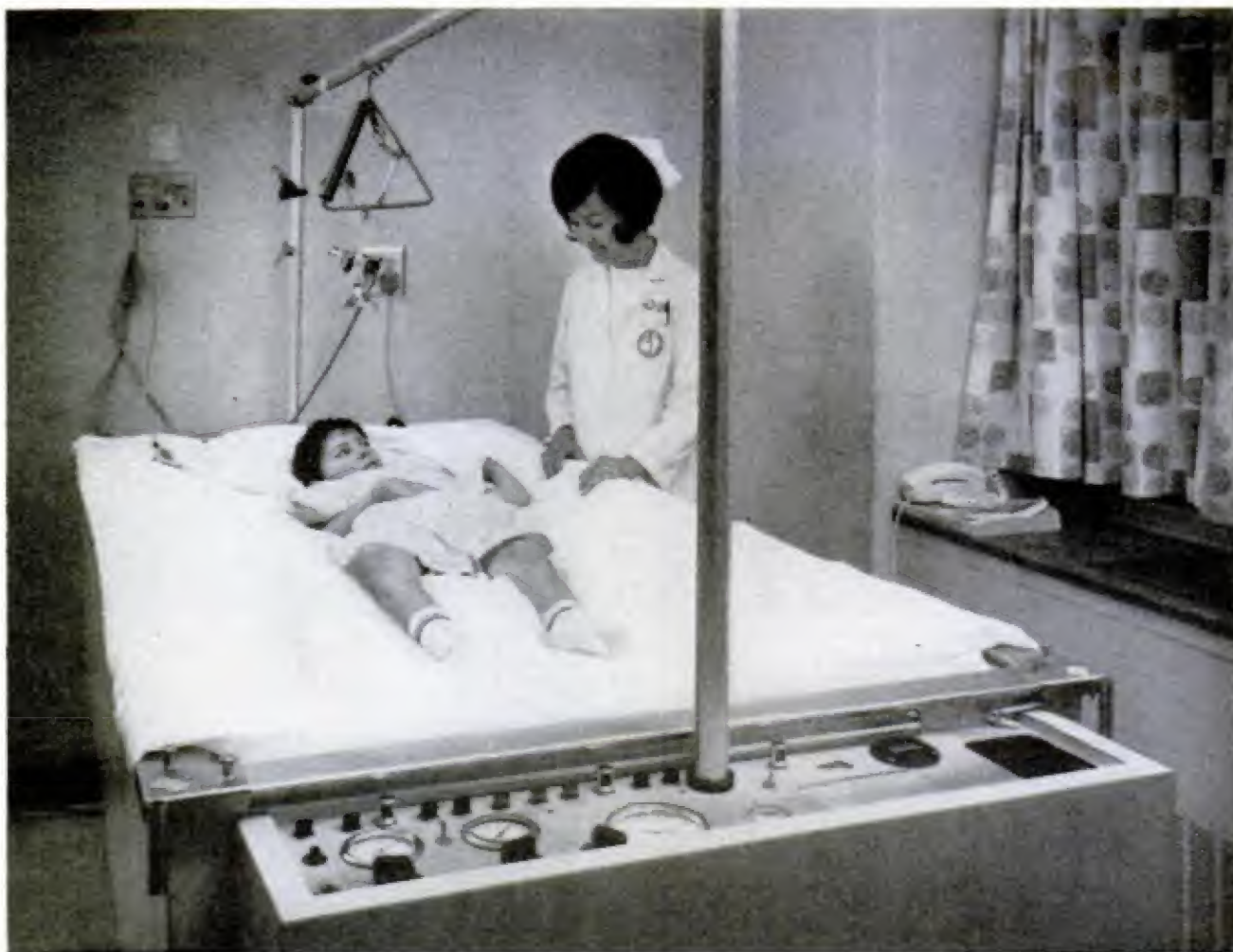


Paris firemen give motorcycle units a test

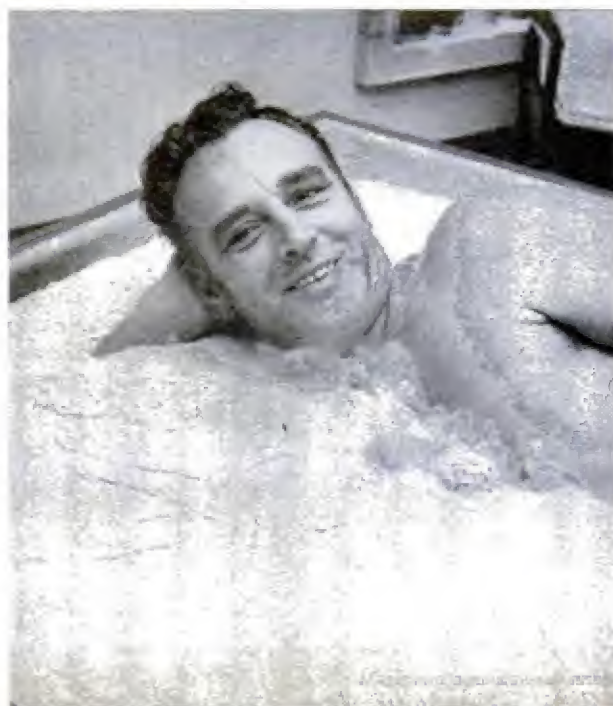
Finding that their regular firefighting equipment often became bogged down in traffic, Paris firemen are experimenting with a motorcycle-mounted unit that can thread its way through clogged streets and get a head start on a blaze.

IT'S NOT CLOUD 9

The patient floats on billions of beads in motion. In this



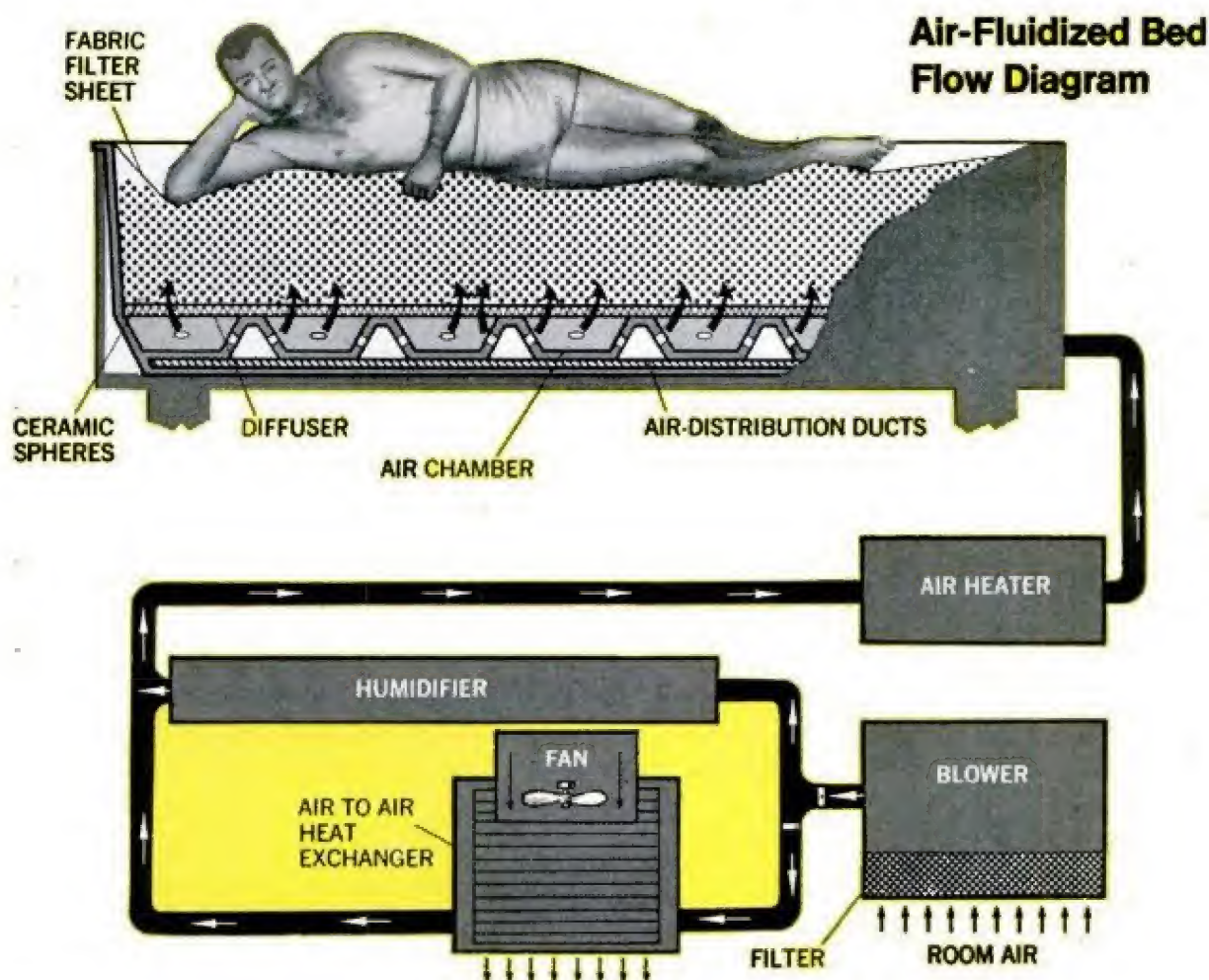
BEADS AND AIR add up to comfort for young patient. In photo below, a special porous plastic sheet was removed so that bead action could be shown. When air is turned on (right) the beads are activated, causing the man to sink several inches. He now floats on a bed of billions of moving beads



-IT'S SUPERBED!

By JAMES PICKERELL

bed burn victims are more comfortable and heal faster



PATIENTS with severe body burns often don't rest well—or heal readily—in the standard hospital bed. Frequently the mattress presses on burned areas and retards air circulation, vital to both comfort and healing.

This problem, of long concern to medical men, now is largely solved by a bed created by Thomas J. Hargest, director of engineering development at the Medical College of South Carolina, Charleston. Working with medical college surgeons, he designed an "air fluidized" bed in which the patient floats on billions of ceramic microbeads like fine sand particles. Beads are kept in motion by a flow of air up through the bed's bottom.

Humidity and air temperature are closely controlled. A polyester sheet

covering the beads is porous to permit air flow. Result: The patient is gently supported by a medium that has more buoyancy than fresh water and none of the instability associated with liquids.

The bed eliminates the need to turn patients frequently to prevent adverse effects. Many patients, according to South Carolina college physicians, showed no ill effects even though they remained in one position for weeks.

People who have tried the bed say it feels as though "you're floating on water." It's so soothing it has cured people of insomnia and even benefited psychiatric patients. The bed is made by the Milton Roy Co., St. Petersburg, Fla. But don't plan on buying one. It costs \$8350 and weighs 2400 pounds—quite a load for your bedroom joists. ★★★

'71 Championship Racing Preview: *Year of the Triple Crown*

The Indy 500 is time-honored; California's Ontario 500 was a splashy success in '70; and now for the first time a USAC 500-miler is running at Pocono International Raceway in Pennsylvania. Can three big ones a year become a tradition?

By BILL HARTFORD, Auto Editor

A BIG BOOM IN THE BALLOON BUSINESS because of auto racing? Well, not really, but Indy has been releasing hundreds of balloons in one big whoosh during pre-race activities for years. Ontario started the custom last September, and now Pocono International Raceway is in the market. There's really no way that those released this Memorial Day in Indianapolis for the 55th annual 500 will float east and fly low over Pocono on July 3rd. Even the farsighted entrepreneurs who carved the Pocono plant into the Pennsylvania hills can't make that happen—they'll have to buy their own for the inaugural 500.

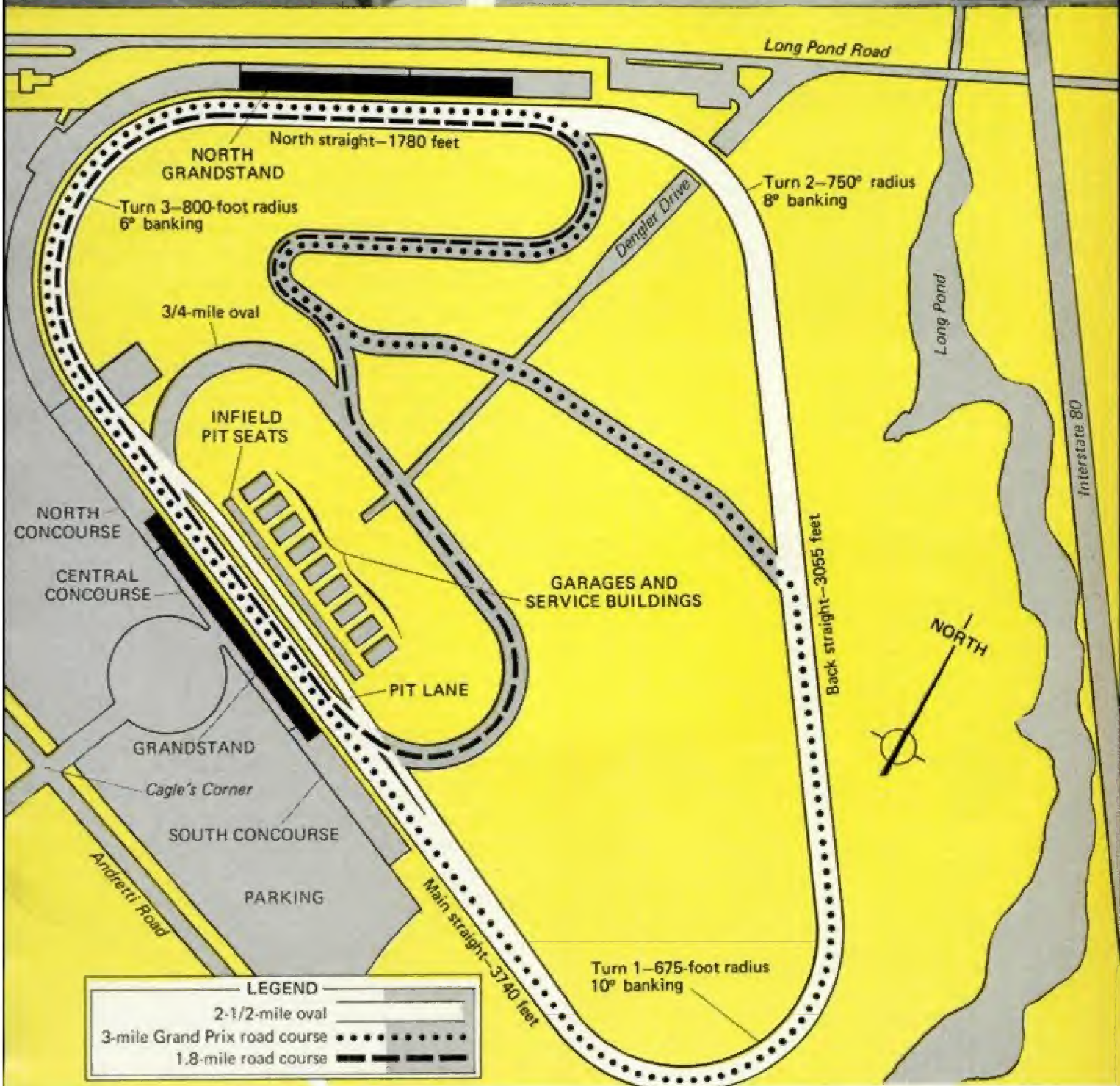
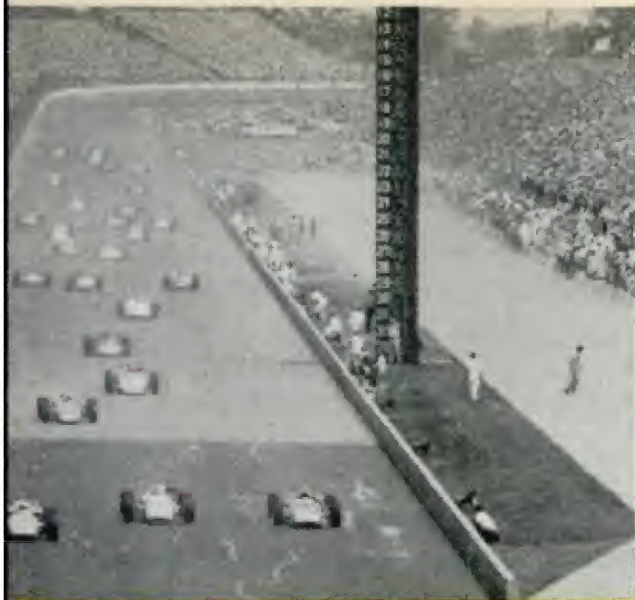
Where the promoters buy their balloons and how much they pay is only one detail in the complicated economics of auto racing—and complicated economics they are. Pocono represents an investment of \$6 million (which is quite a conservative figure when compared to the almost \$30 million supersplash that is Ontario). You don't build a facility like that and then hope someone will come and use it. It takes *promotion* to get the big purses to lure the big teams for big-time racing. That's where the beer and butts come in. There's no smoking in the pits and no drinking and driving . . . but the 500-miler at Pocono is officially the *Schaefer 500* and it's

POCONO INTERNATIONAL RACEWAY in Long Pond, Pa., is a versatile plant with several circuits. Address is Box 500, Mount Pocono, Pa. 18344. Tel: 717-646-2300



Raceway Village



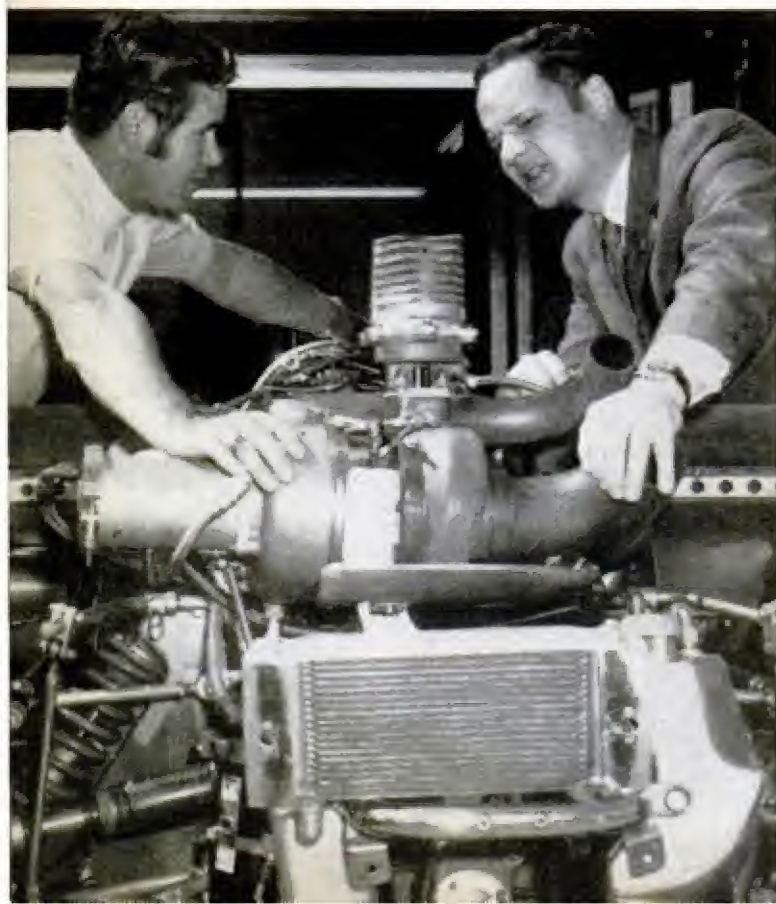


Map Illustration by John Lind
MAY 1971



A.J. FOYT, a three-time Indy winner, is observed making his usual prerace checkout at Ontario last September in this photo by PM Editor Bob Crossley

AL UNSER (left), '70 Indy winner, discusses turbo-charged Ford in his Colt racer with Peter Firestone



one of the three 500s this year on the *Marlboro* Championship Trail. Enough said.

To the several hundred investors involved, Pocono International Raceway is an operation based on the hope that race fans can't get enough of a good thing—and I'm sure they're right. The purists will mourn: The once-a-year drama at the Brickyard is no more. But the Schaefer 500 will bring the USAC championship cars to the East for a major race for those fans who've never been able to make Indy, and to capture the imaginations of potential race fans.

Drivers and teams, too, can't get enough of a good thing and every driver running at Indy this month will wend his way east in search of the Pocono pot o'gold—a purse that's pushing \$400,000.

At this writing (in February), the first official entry has been received: a three-car team from STP. Mario Andretti, in his third consecutive year with STP boss Andy Granatelli, will drive a new Ford-powered McNamara and Steve Krisiloff, a young, quick-learning USAC driver will handle the '69 Hawk that Mario drove to win at Indy in '69.

When Pocono opens for practice June 19 and when the 33 starters are determined during qualifying the weekend of June 26, early-to-arrive fans will see the open-wheel cars running on the most unusual paved oval on the USAC circuit. It's actually a challenging tri-oval with varying-length legs, turn radii and banking. Road course configurations, drag strip on the main straight and a three-quarter-mile oval add versatility for other events at Pocono. Actually, the plant has been opening a little at a time as construction has progressed. The small oval has already seen competition, and *PM* used it for car testing soon after it was complete (See [Maverick Versus the Mob](#), page 73, Aug. '69 *PM*). But the Schaefer 500 will be the raceway's "grand opening."

Among the many new race cars being designed and prepared especially for the Indy-Pocono-Ontario Triple Crown will be two all-new McLarens desig-



JOE LEONARD, lap-record holder at Indy, sizzles Ontario track in a Colt before last year's California 500

nated M16s. They'll be powered, as were last year's cars, by twin-cam, turbocharged Offys. Visible differences from last year are radiators moved from the nose to outboard beside the driver, giving the front end an even more accentuated wedge shape, and redesign of exhaust manifold for lower, more efficient placement of the turbocharger. The supersharp McLaren team, with Denny Hulme and Peter Revson doing the driving job, was already testing at Ontario in February. Last year's M15s were the most innovative at Indy, and come their Memorial Day debut, the M16s will be cars to watch.

Mark Donohue, in fact, having run Lolas in the past two Indy 500s (finishing second last year) is, at this writing, testing a McLaren machine at Phoenix International Raceway. It appears certain the Penske racing team will make the Triple Crown with both a Lola-Ford and McLaren-Offy. David Hobbs, a British driver known for his SCCA Formula A wins, will be the second driver.

The new STP-McNamara Special is lighter and longer than last year's car. The red machine has inboard rear brakes (a first on championship cars), and a whole flock (five sets) of wings protruding from the body for aerodynamically improving handling. Mario's concern with handling has led to design and position of the fuel tanks to minimize the sloshing of fuel. Half-filled tanks of fuel comprise roughly one-fifth the total weight of the car and, when this weight is shifting, can have significant effect on handling.

MAY 1971

Fuel considerations have also led Pono (maybe Indy and Ontario, too) to require four mandatory pit stops for the 500. This is a departure from Indy's traditional three stops. With only three pit stops, fuel must be crammed in right up to the neck. With rubber fuel cell and fuel lines filled, rupture of the system (usually at the hose connections) is more likely than if there were some unfilled space in the system to provide pressure relief. Four stops will allow less fuel to be taken on board each time. Of course, pit stops are part of the excitement of auto racing and the new ruling means more of that.

As Dan Gurney mentioned in *Driving With Dan* last month (page 38, April PM) two new Olsonite Eagles are in the works for Swede Savage and Bobby Unser for the 500 milers. Swede won his first USAC race at Phoenix [\(Please turn to page 186\)](#)



DENIS HULME, Can-Am champion, tests new McLaren M16 designed for '71 season. Note front-wheel suspension moved inside body shell to allow smooth air-flow to radiators repositioned beside the driver



Grand Prix car has wings

The "platter" at front is a wing, and it's followed by an aerodynamic body, enclosed engine, cockpit and a rear wing. What is it? The STP March 711 Grand Prix which has the lowest frontal area of any car and (in this version) 435-brake hp from two Ford V8s.



Screaming three-wheeler

Take a 90-hp Corvair engine, a Hartley frame, aircraft landing lights and other defunct car and motorcycle parts and you have this wild motorized "velocipede" constructed by Frank Evans of Mesa, Ariz.



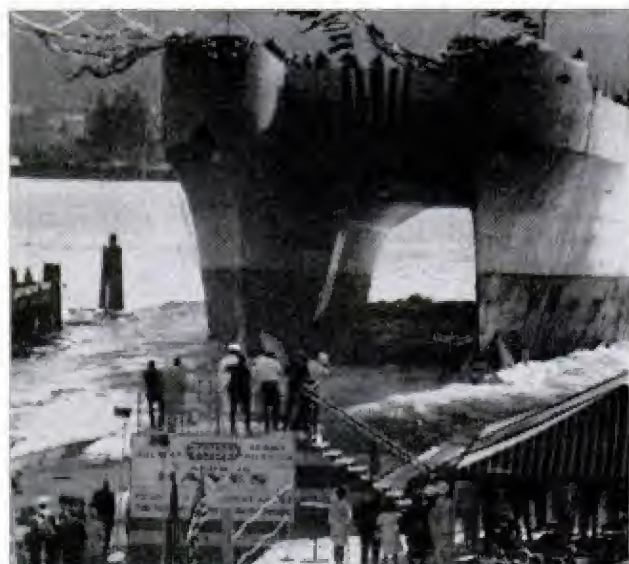
Antisucide bridge

Seventeen suicides in six months led to a high steel barrier on this German bridge.



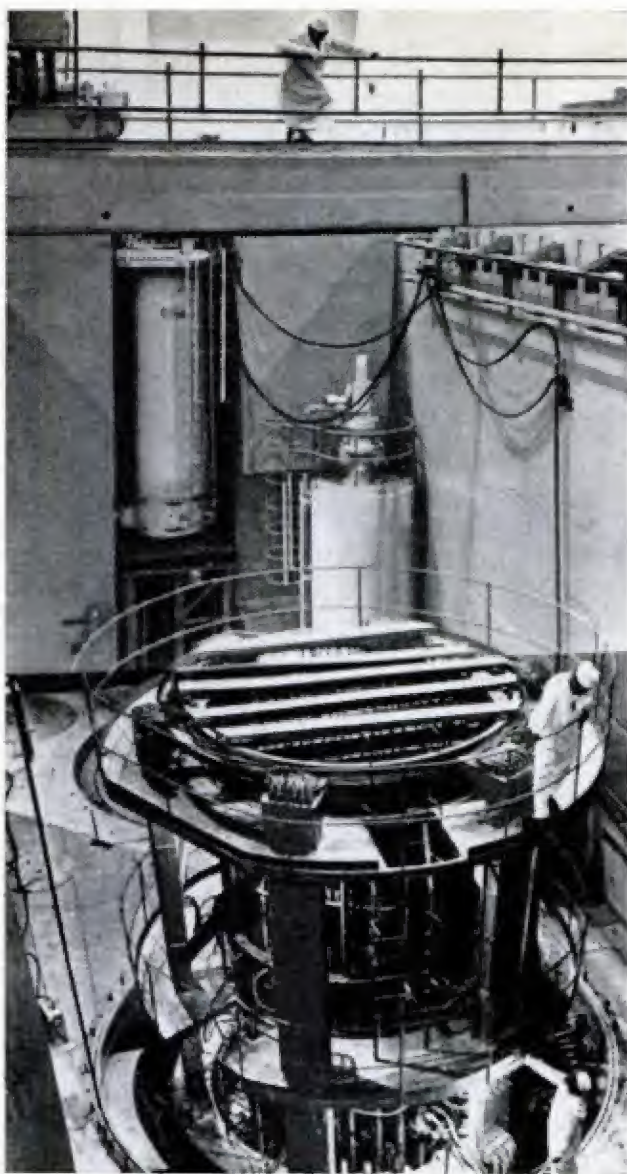
Tires leave tread-prints

The tread-prints of experimental tires tell much about performance. Mounted on a static load machine and coated with dye, this 2800-pound, 28-ply front-end-loader tire runs off a print for a technician of General Tire and Rubber Co. of Akron, Ohio.



Giant cat for research

One of the largest catamarans ever constructed, this 246-foot Navy vessel displaces 3080 tons, cruises at 15 knots and accommodates 25 scientists and a crew of 44. Christened *Hayes*, she will stream oceanographic instruments between the two hulls providing a uniquely stable platform. Controllable-pitch props turn her in her own length.



Soviet atom power station

Shown in the "hall of reactors" at a massive Russian nuclear power plant is a unit under construction which will add 880,000 kilowatts to a present capacity of 575,000.



Pop-up paper for the blind

Polyethylene paper that pops up under pressure from a pencil or ballpoint pen can be used by the blind for drawing or writing. Mrs. Ruth Barr, a hospital occupational therapy head, discovered its unique properties.

MAY 1971



Barrel bucks like bull

It looks improbable, but this bucking barrel gives the action of a bull or horse. Backyard cowboys Clyde Gavin and Don Hinkle of Phoenix built the reciprocating machine that bucks when towed by a car at 3 mph.



Want to go 'Boatalooning'?

It's either a motorboat, a balloon or both. Designed by Brooks Stevens, the Boataloori is a 48-foot-high helium balloon secured to a round fibreglass boat. The 30-hp outboard motor propels the craft in air or water. Don Piccard built the balloon portion. This prototype (tethered) appeared at a sports show.

87

Owners find much right, not much wrong with Satellite

By **MICHAEL LAMM**, West Coast Editor/Photos by the Author

SATELLITE BUYERS put styling first as their reason for buying. They rank styling and handling equally under "Specific Likes," meaning they're as satisfied with the way the car performs as with their initial impression.

Many an owner commented that his new Satellite looks "sporty" without the discomforts or high price of a true sports car; that it handles with the surety of a sports car, yet has the comfort of a full-fledged intermediate; that in several cases he'd checked out the ponycars and had settled on a Sebring instead, because it "... equals ponycars in looks but beats them on interior space and trunk and costs no more."

Being in a mood to buy sporty but still needing practical, reliable transportation, more than half our respondents chose the jazzier Sebring/Sebring Plus two-door hardtop (60.9 percent). This stands on the 115-inch wheelbase

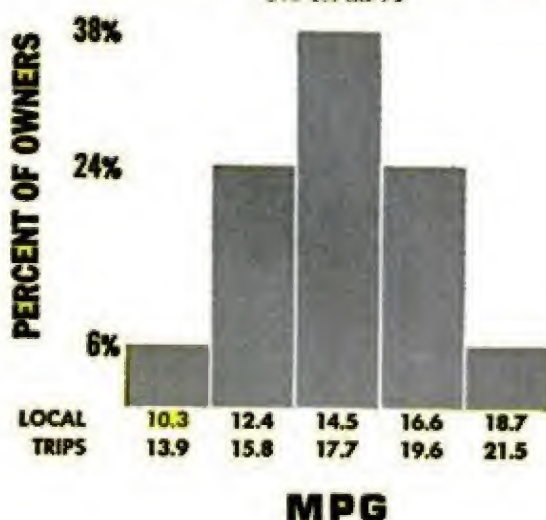
instead of the 117 for sedan and wagon; thus it's tighter on rear legroom. Few complained, though, about pinched toes there, probably because they realized the lack before they bought the car.

Actually there were few complaints. When we asked, "Did you have any mechanical troubles?" 60.4 percent said "no." On specific gripes, the largest response was "none" (23.5 percent), followed by "sloppy workmanship" at 12.1 percent. Those figures can be considered good news for any carmaker.

Rather than list comments under specific headings this time, here are four representative questionnaires, giving all answers as received. (We send out at least 1000 questionnaires for each Owners Report—in this case to owners of Plymouth Satellites. These are mailed by an independent Detroit firm that keeps records of new-car purchases. Owners are chosen at random, live in

SATELLITE FUEL MILEAGE CHART

318-cu.-in. V8



SATELLITE'S SIZE accommodates six people in comfort, yet glovebox is within easy reach of the driver





OWNERS RANK handling and styling their top "likes." With normal tire inflation Satellite heels quite a bit

all sections of the country, represent all age groups and vocations. Replies are mailed to New York, where answers are computer-tabulated.)

The first of our four representative questionnaires (questions in italics), comes from a 21-year-old laborer in a Cabot, Pa., cement plant:

Any mechanical troubles so far? "Car was recalled once due to possibility of a defective brake-drum anchor pin. No charge. Part was replaced."

How do you rate your dealer? "So far, service has been satisfactory. I was a GM customer before, but since Chrysler has made such a good-looking car, I decided to try a Sebring Plus."

What about workmanship? "A few flaws could have been avoided, but am

working them out with help of dealer."

What changes would you like? "None."

What about comfort? "One of the most comfortable cars I've driven. Passengers also agree."

What options on your Satellite? "Power steering, AM/FM stereo, tinted glass, Strato-Air ventilation, 383 2-bbl., console, light group."

What other cars in your family? "1963 Fairlane and 1964 Impala."

What are your specific praises? "Beautiful style and paint job, good performance, very good handling."

Specific complaints? "Annoying 'crack' sound when I put it in reverse on a cold morning; otherwise none."

Next we selected the questionnaire of

LARGE, FLAT TRUNK would benefit from Space-Savr or vertical spare. Tire now hogs middle of the trunk

MODERN, CLEAN STYLING was major incentive for buyers—52.6 percent put it ahead of other reasons



a 49-year-old consultant to the Department of Defense in Washington. About his 318-c.i.d. Sebring Plus, he said:

Any mechanical troubles? "No." *Dealer opinion?* "I have an excellent dealer whose entire staff is the most courteous, fair, and thorough I have dealt with in over 28 years of new-car buying." *Why Satellite?* "Because of excellent service of Chrysler products, styling, quiet ride, price." *Workmanship?* "Excellent." *What changes?* "Enlarge trunk." *Comfort?* "Bucket seats very comfortable." *What options?* "Power steering, heavy-duty brakes and suspension, airconditioning, tinted glass, rear speaker." *What other cars in your family?* "Duster." *Specific praises:* "Appearance, quality of workmanship, handling and roadability, quiet ride, dependability of 318 V8." *Complaints?* "Trunk could be bigger. Sorry, that's all there is. I've owned 12 new cars—GM, Ford, and Chrysler—have never been as pleased as with the Sebring Plus."

Now a 26-year-old design layout draftsman from Beaver Falls, Pa. *Mechanical troubles?* "Valves knock after 2000 miles." *Dealer opinion?* "Hard time getting scheduled for service. At this time, valves not corrected. Sales policies very fair." *Why Satellite?* "Owned a 1967 Plymouth and was very



HIDDEN WIPERS came in for gripes, as did lack of vent panes. Flow-through system can't compensate

satisfied." *Workmanship?* "Body work is sort of sloppy—very hard to get out rattles." *What changes?* "Too much sheet metal under front end; too hard to clean; needs bigger glovebox; can't see where car ends." *Options:* "Light package, whitewalls, wheel covers, remote outside mirror." *Other cars:* "None." *Praises:* "Looks, handling, comfort, good pickup and power, nice interior." *Complaints:* "Workmanship could be improved."

A Massachusetts teacher, 37, owner of a six-cylinder Custom four-door sedan: *Any mechanical troubles?* "Pipe from Clean Air Package to exhaust manifold loose, immediate repair; sticking carburetor valve, immediate repair; recall campaign, item brakes—dealer called me." *Dealer?* "I bought the car because of his service, have not been disappointed." *Why Satellite?* "For family, shopping, etc.; Six for economy." *Workmanship?* "Good to average—the usual teething problems." *Changes?* "Prefer front vent windows. I don't like to open a whole window to get air, especially on a cold or wet day." *Comfort?* "Front is a little tight—I'm 6 feet." *Options?* "Radio only. Who needs more?" *Other cars:* "None." *Praises:* "Excellent car generally, large trunk,



REAR SEAT has enough legroom in four-door, but hardtop, with 2 in. less wheelbase, pinches the toes
90

Summary of 1971 Satellite Owners Reports*

Total miles driven491,412

Average miles per gallon

225-cu.-in. 6, local driving...16.3
long trips19.1
318-cu.-in. V8, local driving...14.5
long trips17.7
383-cu.-in. V8, local driving...12.1
long trips14.8
(mpg for 426 and 440 V8s not available)

Series and body styles:

Sebring34.8%
Custom29.7
Sebring Plus26.1
Regent5.1
Brougham4.3
2-door hardtop56.1
4-door sedan28.5
4-door wagon15.4

Engines:

225-cu.-in. 610.5%
318-cu.-in. V875.2
383-cu.-in. V813.7
426-cu.-in. V80.0
440-cu.-in. V80.7

Transmissions:

Automatic90.1%
3-speed manual5.9
4-speed manual3.9

Why the Satellite?

Styling52.6%
Past experience22.4

Price20.5
Size15.4
Economy9.6

Specific likes:

Styling49.0%
Handling49.0
Comfort20.4
Ride19.7
Performance19.7
Economy19.7
Power10.9
Size10.2

Specific dislikes:

Workmanship12.1%
Rattles9.4
Vent system8.7
Visibility7.4
Gas mileage7.4

What changes would you like?

Better vent system14.8%
Styling changed13.1
Better rear vision11.5
Better workmanship5.7

Had any mechanical troubles?

No60.4%
Yes39.6

What kind of trouble?

Carburetor21.7%
Electrical10.0
Brakes8.3
Shifting mechanism8.3

Did you repair it yourself?

No96.7%

Yes3.3

Dealer repairs satisfactory?

Yes42.7%
No37.3

Other cars owned:

Plymouth19.4%
Chevrolet13.9
Dodge13.9
Chrysler12.5
Ford9.7
Buick8.3

Accessories/power options:

Automatic transmission90.1%
Power steering51.9
Radio51.6
Airconditioning44.1
Power brakes28.8
Tinted glass23.0
Light group20.4
Vinyl roof13.8
No options10.5
Console10.5
Whitewall tires10.5
Power tailgate3.3
Power windows1.3

Age distribution of owners:

15-29 years28.8%
30-49 years45.6
50-plus25.6

Would you buy another Satellite?

Yes85.9%
No14.1

*Percentages might not equal 100% due to rounding and/or insufficient data.



HIGH DEGREE OF BODY TUCK leaves some owners grumbling about mud and slush tossed up by tires. Vinyl side molding prevents parking nicks, but many owners didn't know it was available; salesmen didn't tell

they moved spare to one side, thus increasing usable space." *Complaints:* "Odometer cable and handbrake cable stick through front wheel well, an excellent snow catcher."

One question we read with great interest was *What changes would you like?* Here are some random answers:

"Disc brakes as standard equipment." "Keep the tasteful pinstriping, but use paint, not tape. Mine wasn't very well applied, so I removed it all rather than

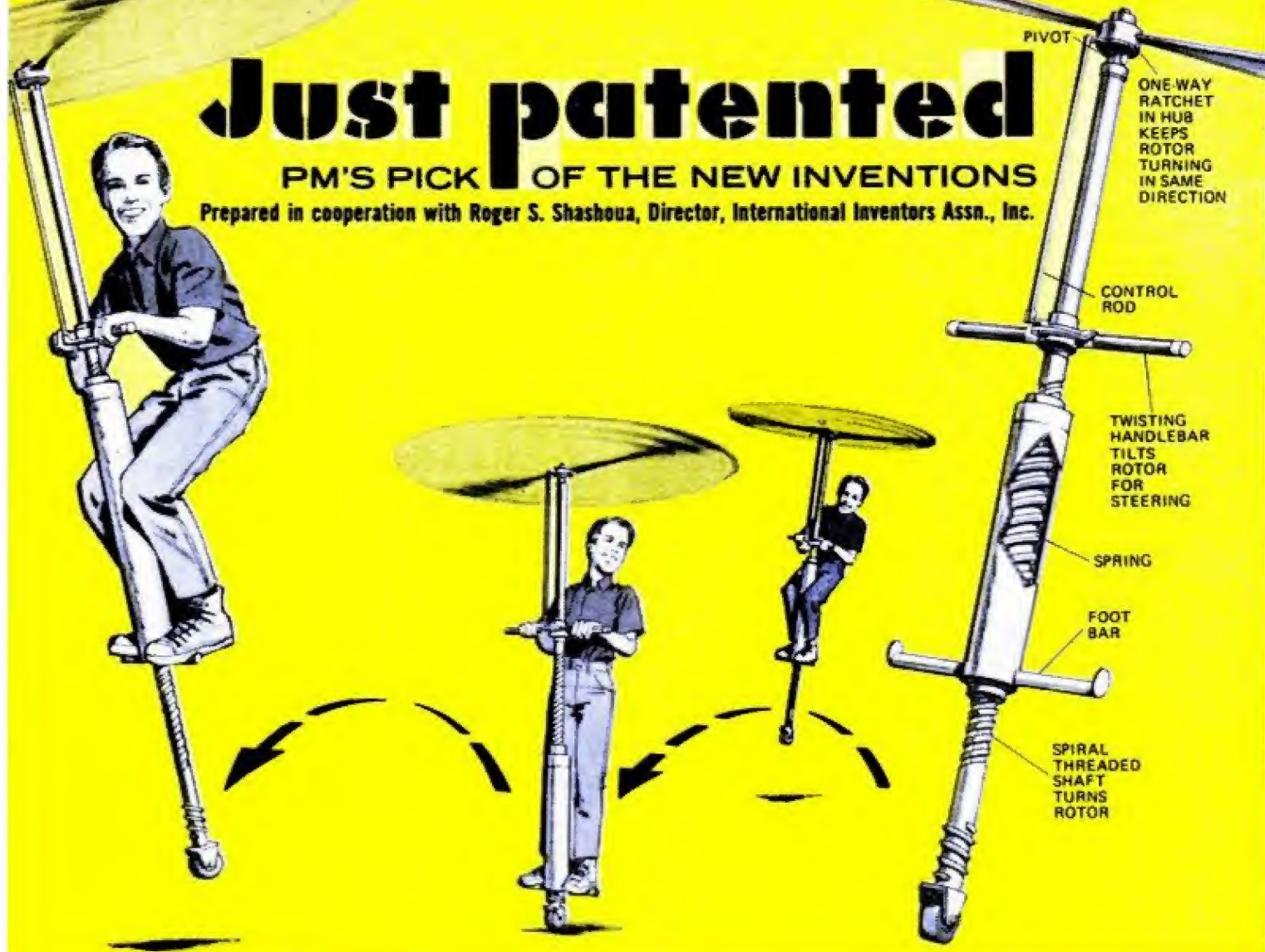
have bits and pieces come off." "Move taillights up from bumper—they get broken too easily." "Definitely have vent windows on front doors again." "Twelve-month warranty not enough for a car that costs \$3900." "Redesign console cover plate—it doesn't fit and looks shabby."

So you see, all recommendations are relatively minor. By and large, Satellite owners do seem more satisfied than most by their purchases. ★★★

Just patented

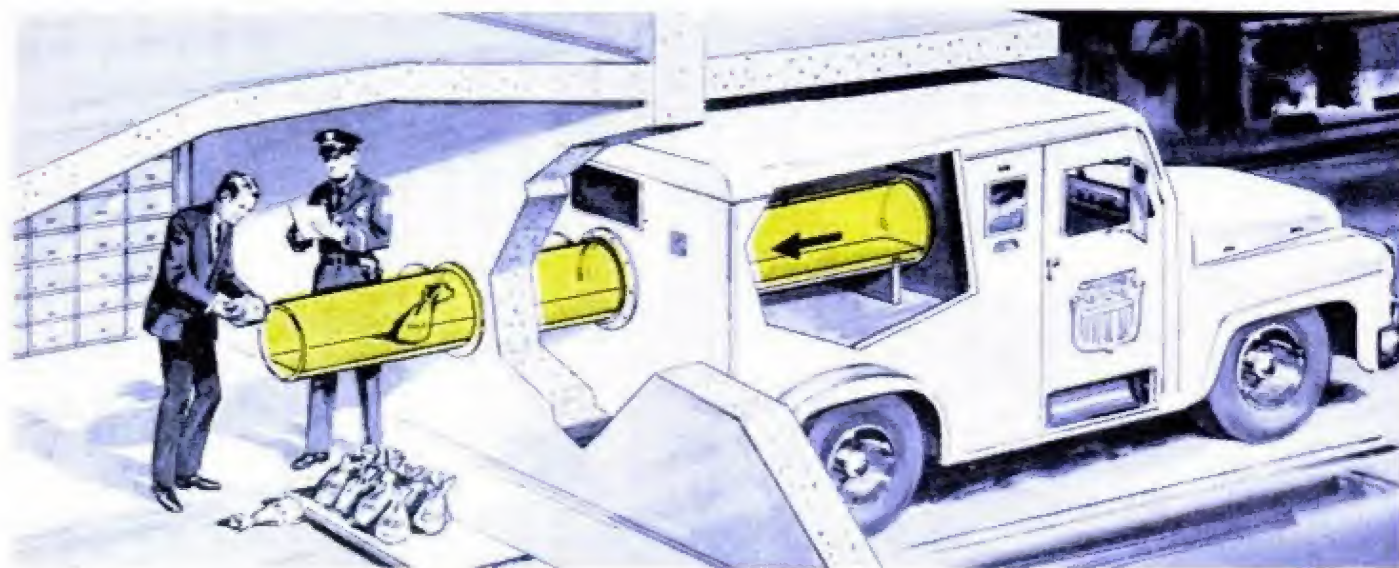
PM'S PICK OF THE NEW INVENTIONS

Prepared in cooperation with Roger S. Shashoua, Director, International Inventors Assn., Inc.



1. PROP-POWERED POGO STICK is designed to give added lift and longer hops through the air. Pumping up and down on the foot bar turns a spiral-threaded shaft rapidly back and forth. The rotor on top is driven by the shaft through a one-way

ratchet so it always turns in the same direction even though the shaft reverses direction. Twisting the handlebar tilts the pivoted rotor in the desired direction to provide steering control. A powerful spring supplies upward bounce to start each jump



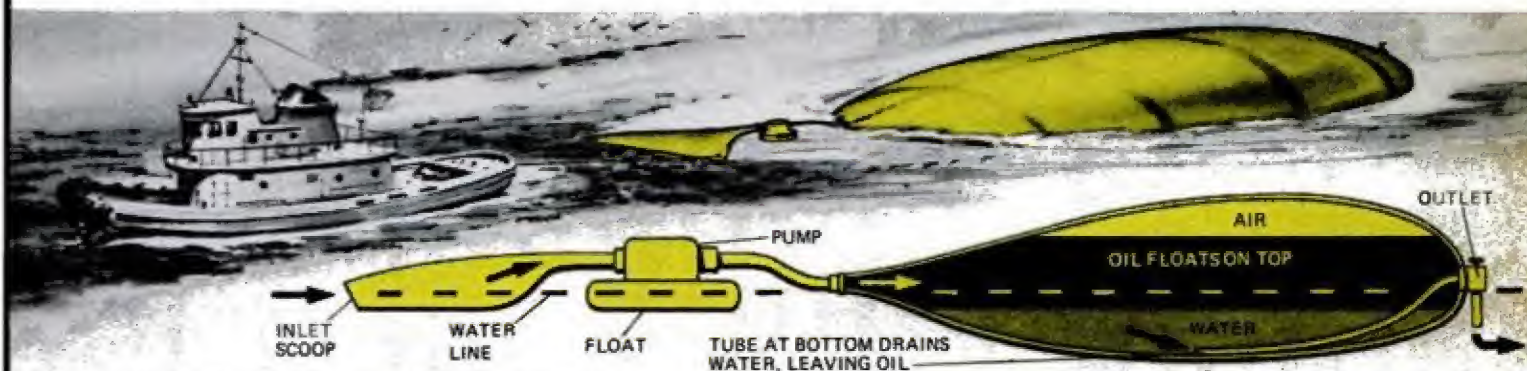
2. THIEFPROOF BANK TRUCK never has to load or unload valuables in the open. It simply backs up to a bank and a telescoping tube extends into the building through a port in the wall. Money is then

put in or taken out and the tube retracts back into the truck. During the trip, the valuables are kept locked in the tubular vault and can't be removed even if the truck is waylaid by would-be robbers



3. WATER DOES THE BRAKING in this system for slowing large cargo ships and tankers. Inlet ports in the bow are opened, allowing water to rush into two ducts. The ducts curve around and come out at the sides so the water is actually expelled in

a forward direction, helping to stop the ship. By opening only one inlet, the water can be jetted to the port or starboard, forcing the bow in the opposite direction for extra steering control in delicate maneuvers. For cruising, the inlets are closed



4. SOPPING UP OIL SPILLS to prevent pollution is the object of this ingenious idea. A large plastic bag is towed along by a tugboat while a mixture of oil and water is drawn in through a scoop and pump. Inside the bag, the oil floats to the

top, leaving the water at the bottom. The water is gradually forced out a drain tube until the entire bag is filled with oil. The bag is then towed to shore and its contents pumped into tanks, saving the oil for use as well as eliminating pollution damage



5. JUST ROLL IT OVER—that's all you have to do to reach the underside of your car with this rock-like cradle. The car is jacked up and the wheels removed from one side, then the cradle is bolted

to the wheel studs. With the rockers in place, two men can easily roll over an average-size car. The idea is to save the cost of hydraulic lifts and give mechanics a more comfortable working position

Inventors of the items shown on these pages are as follows: 1. Harold C. Bush, 9750 Knolson St., Livonia, Mich. (No. 3,467,375); 2. Aldennis, Virginia Anne and Anna Gordon, 310 N.W. 7th Court, Hallandale, Fla. (No. 3,507,409); 3. Dr. John English, National Physical Laboratory,

Feltham, Middx, England; 4. John E. Woolley, Southport, England (No. 3,508,652); 5. Carena Engineering Co., Ltd., Scholes, Cleckheaton, Yorkshire, England. Roger Shashoua can be reached at the International Inventors Assn., Inc., 680 Fifth Ave., New York, N. Y. 10019.

Now: Teenie Two!

Three years ago this month, *PM* offered plans for a \$600 VW-powered plane—and launched an air fleet. Over 7000 plans were sold and Jeanie's Teenies were built all over the world. Now we bring you the sleek, faster second-generation version of this popular plane

By KEVIN BROWN

THREE YEARS AGO this month *Popular Mechanics* dropped a bombshell in the amateur aircraft field when it introduced on its cover a Volkswagen-powered all-metal airplane that a beginner could build with over-the-counter parts and hand tools for less than \$1000. *PM* sold more than 7000 sets of plans. Planes built from them are flying in all parts of the world.

Now, after three years of development, here's Teenie Two. Designed by Calvin Parker, who created the original Teenie, the Two is an entirely new plane that retains the easy construction techniques but includes design changes that make it a faster, sturdier and even more dependable airplane. Teenie Two's rounded bulkheads and curved fuselage skin, clean back and swept vertical stabilizer give it a

TEENIE TWO PROTOTYPE flown by designer Cal Parker (above and top, facing page) is aerodynamically "clean." Gone is "broken back" look of Jeanie's Teenie. Curved fuselage, larger windshield, raised backrest, straked tail and nose cowlings make difference. Teenie Two (shown at right on ground) has 18-foot wingspan, a bigger engine, 1500-fpm climb rate with a 54-inch prop. Frank Gore, Pensacola, Fla. (left), machinist, works on first Teenie Two built from plans. The construction techniques are just as simple as JT's





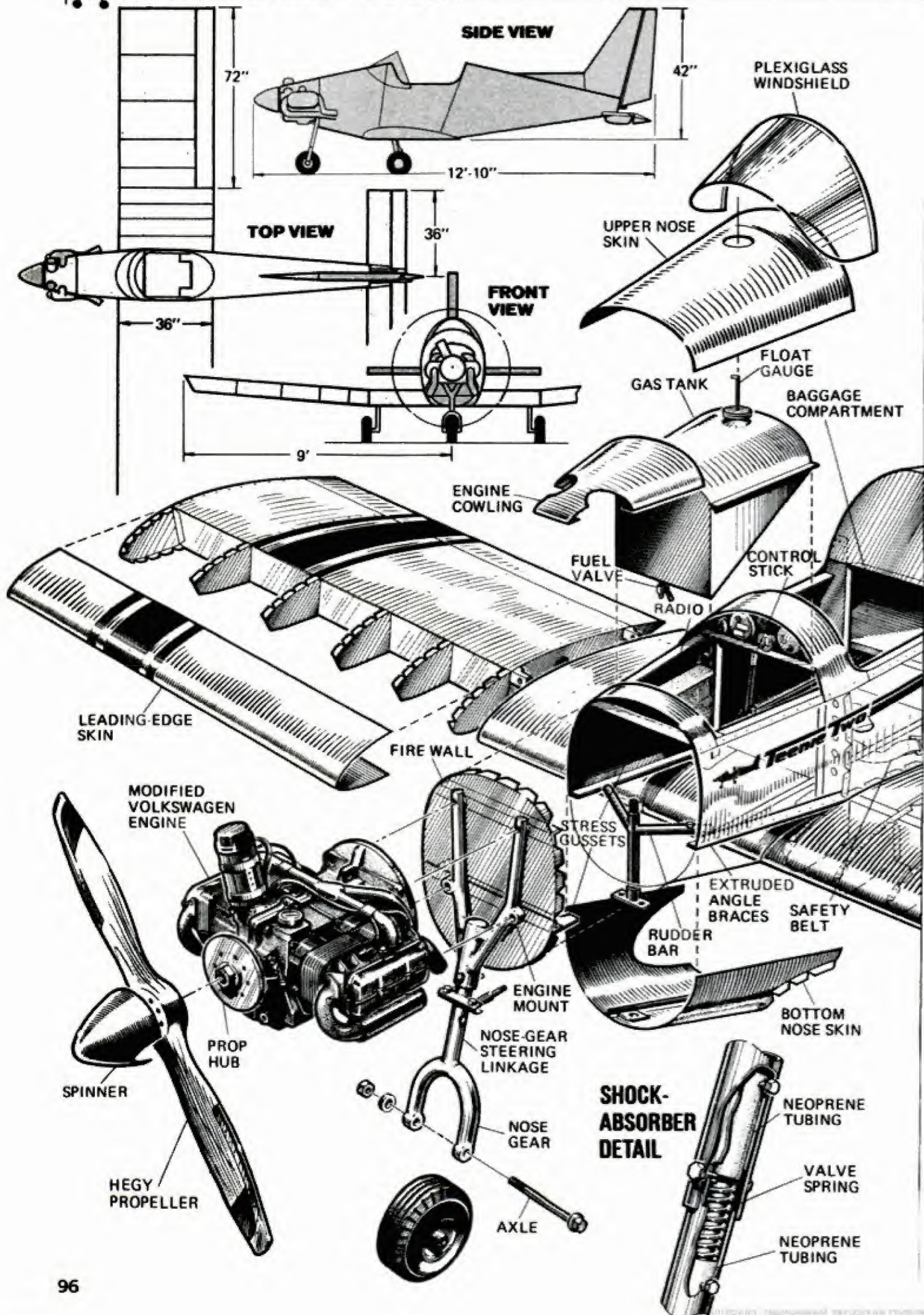
"flying" look. The new plane has a larger engine and propeller for better performance, larger fuel capacity for greater range, a larger wing to support a larger airplane, a larger cockpit to accommodate a larger man as the pilot, a fixed horizontal stabilizer and a more effective vertical stabilizer. The new design has increased the empty weight from 285 pounds to 310, which necessitates most of the changes.

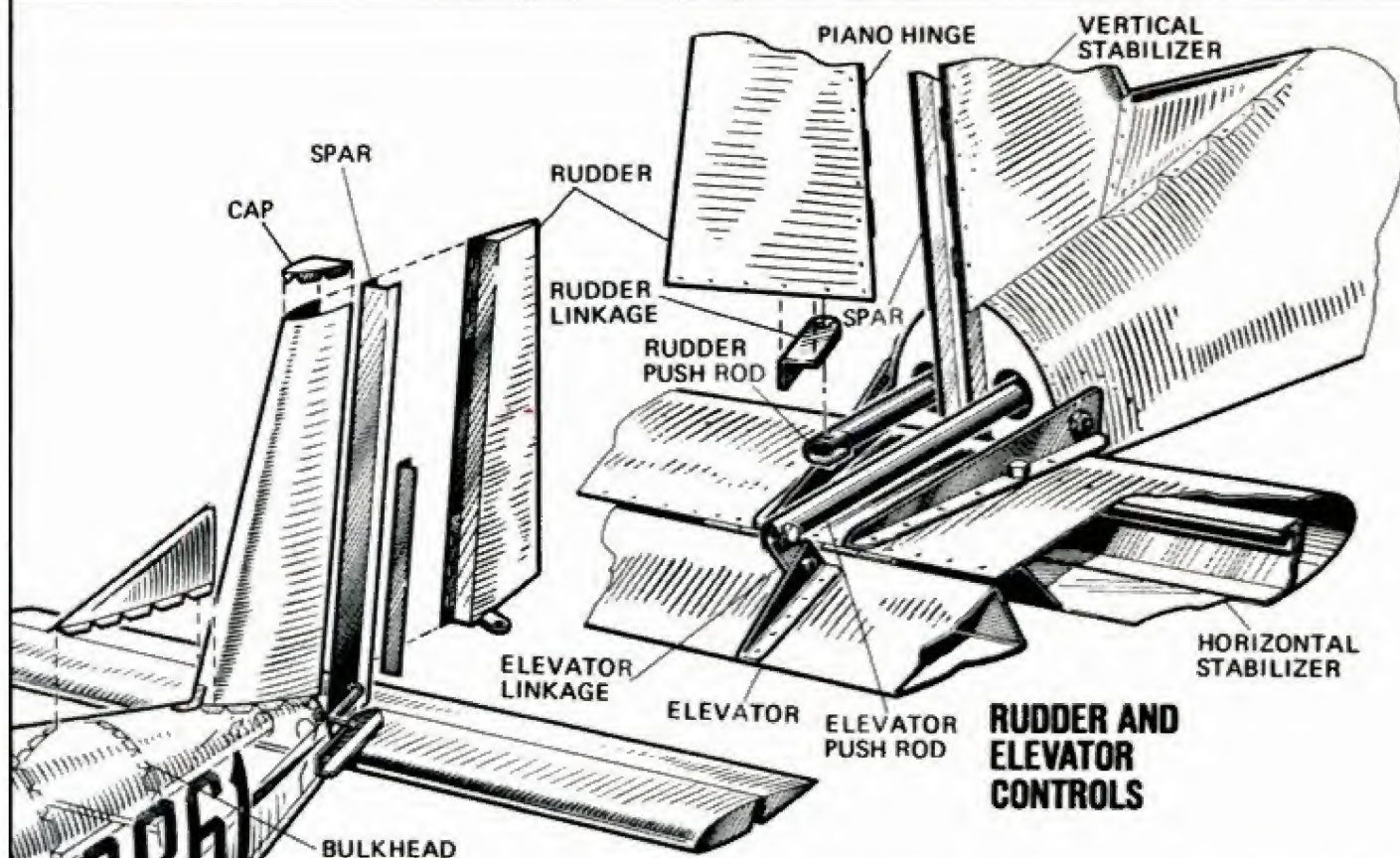
Although Parker reports that a small 36 or 40-hp Volkswagen engine will work if the gross weight is kept down, he recommends at least a 53-hp, 1500-cc VW or the 65-hp, 1600-cc engine. He also advises it's best to buy the individual engine

(Plans and photos are on following pages; [text continues on page 100](#))



Teenie Two



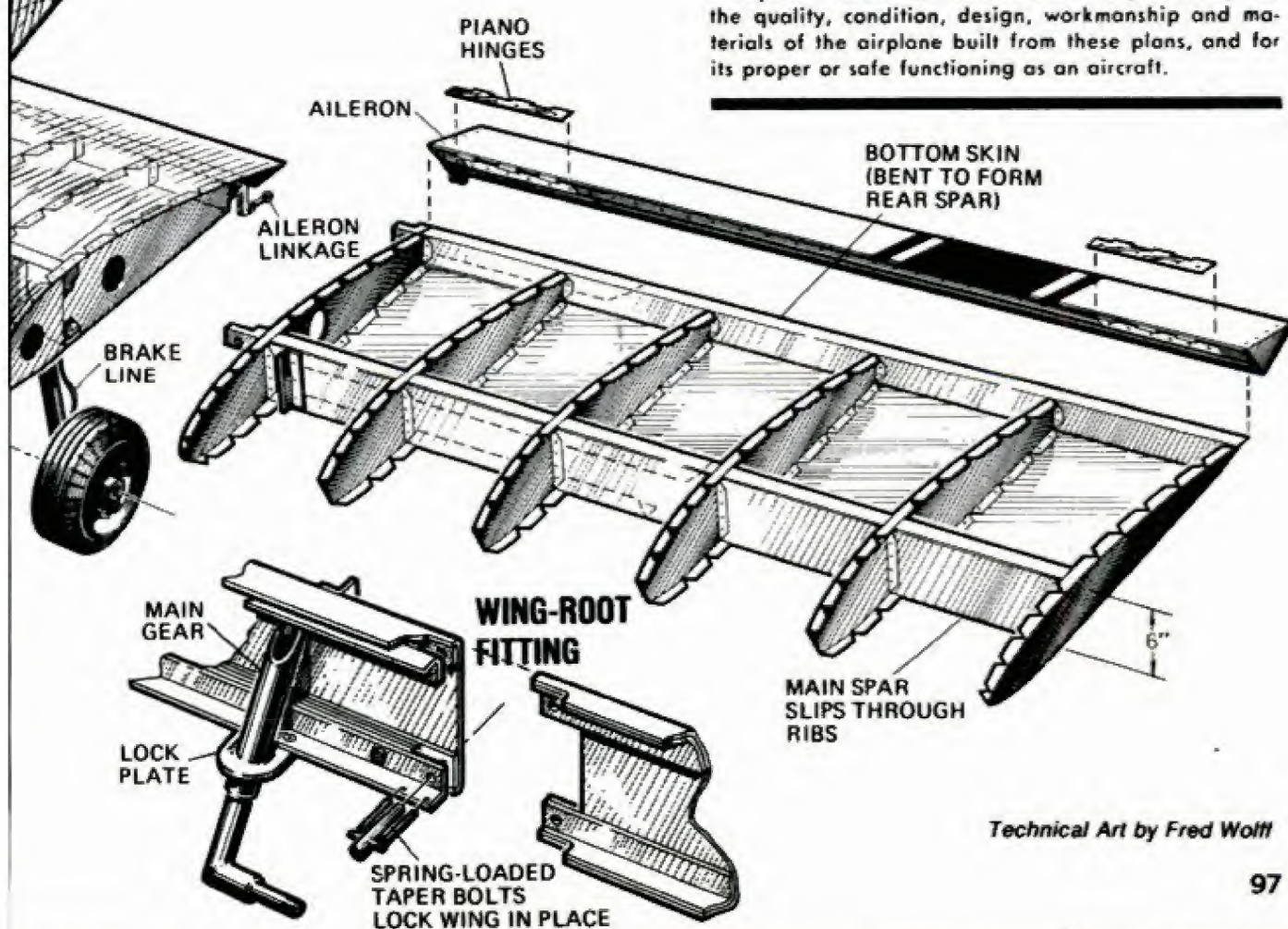


RUDDER AND ELEVATOR CONTROLS

How To Order Plans

For complete instructions and large, detailed plans on how to build this Volkswagen-powered airplane, send \$35 to Service Bureau, Popular Mechanics, Dept. JT, 224 W. 57th St., New York, N.Y. 10019.

Popular Mechanics disclaims all responsibility for the quality, condition, design, workmanship and materials of the airplane built from these plans, and for its proper or safe functioning as an aircraft.



Technical Art by Fred Wolff

PM's Teenie 'Air Fleet'

THE BUILDING of what may well be the world's biggest fleet of tiny planes was launched in May, 1968, when *PM* introduced Jeanie's Teenie. Here are but a few of the many home-built versions of the plane. Some builders followed the

(Text continues on page 100)



ON FLIGHT LINE at Statesboro, Ga., for cover photo of this issue, are JT builders (from left)

Fred Lewis, Savannah, Ga., U.S. Army helicopter pilot, instructor; Bill Blythe, Florence, S.C.; Bud Crawford, Savannah, Ga.; Scott Creighton, Pineville, N.C.; and designer Cal Parker in the new Teenie Two



1



2



3



4



JUST A FEW of the many enthusiastic Jeanie's Teenie builders around the country: 1) Wardell Gibson, Modesto, Calif., spent \$1500, 13 months; 2) Bud Gush, Fort Lauderdale, was first to fly homebuilt JT; 3) John Steere, Buchanan, Mich., has spent \$750; 4) Dave Garner, Tacoma, Wash., made few modifications; 5) Capt. Larry Gibson, USMC, Naval Air Station, Meridian, Miss., has 65-hp VW; 6) John Monnett, Elgin, Ill., spent \$1500 modifying JT plans to build "Messerschmidt"; 7) Major Ralph Hess, USAF (ret.), Coos Bay, Ore., made Teenie high school ROTC project; 8) Clarence Bruggemann (in cockpit) and Bert Matzke started with JT, ended with "Bandido"; 9) Don Rotan, Richland, Wis., has \$600 total investment; 10) Bob Williams, Denver, Colo., built 65-hp VW Teenie that cruises at 100 mph, has 15,000-foot ceiling



design faithfully; others modified it.

Sport Aviation, published by the Experimental Aircraft Assn., commented: "Few airplanes have stirred (more) desire among nonflyers to fly in recent years than the miniscule all-metal Jeanie's Teenie."

Teenies have been completed all over the world, and from coast to coast in the United States. Maj. Ralph Hess, a retired Air Force pilot, adopted the Teenie as a project for his high school ROTC class in Coos Bay, Ore., then flew it when the boys completed it.

"No bugs at all," he reported, "and the cadets learned a great deal from the project. It was the finest teaching tool I had."

Another Air Force jet pilot, Capt. Robert Carnes, still on active duty at Homestead Air Force Base, Fla., built a Teenie, crated it and took it with him to the Far East when he was sent there on temporary assignment. It was promptly stolen by an admiring Oriental. Carnes built another one when he came back, and is still flying it. ★ ★ ★



JEANIE'S TEENIE built by Robert Aymar, Glenwood, Md., from PM plans for \$800. Aymar has commercial, instructor ratings. Ed Woynowski, Grand Junction, Colo., has completed ground tests of JT shown below



Now: Teenie Two!

(Continued from page 95)

parts new and assemble them yourself. It's cheaper and more convenient than buying a complete engine, which has to be broken down anyway to convert it for aircraft use. Conversion kits are available.

Designer Cal Parker says that most of the airframe can be built for about \$350. This includes the plans, all the aluminum and steel, landing gear, firewall and control linkages. It does not include propeller, engine, wheels, brakes, instruments, bolts and rivets. The total outlay, says Parker, will range from \$750 to \$1400, depending on the builder's ability to bargain for the parts and materials.

Teenie Two has a 54-30 propeller (54-inch length, 30-inch pitch). It's noisier, but it gives almost double the rate of climb of Jeanie's Teenie, from 850 feet per minute to 1500. It also allows an added 200 rpm, with 3200 maximum.

The wingspan has been increased to 18 feet (three 6-foot sections), but, more important, the chord has been increased to 40 inches. It gives Teenie Two a better glide ratio. The extra length also makes more room for a larger fuel tank and longer legs. (The cockpit of Jeanie's Teenie wasn't made for big men.)

Teenie Two has a gross weight of 590 pounds, with a useful load of 280 pounds, including the larger 9-gallon fuel tank. The larger cockpit also accommodates a larger windshield.

Changes in the tail section were made to smooth out the performance, which was pretty smooth in the Teenie I. But trimming the elevator in some of them was something of a nuisance.

Teenie Two uses go-kart wheels, the same as Teenie I, but because it's a bigger airplane, Parker now recommends you buy wheels with brakes. The smaller plane didn't need them.

Internal changes are primarily to accommodate the new dimensions, but also to straighten out the humpback

and raise the backrest. You can see from the pictures that the rest, which came only to shoulder height on Jeanie's Teenie is up to head level on the Teenie Two. Details are in the plans, for sale by *Popular Mechanics*. See page 97.

Comparative specifications and performance data on the two airplanes:

Jeanie's Teenie		Teenie Two
36-hp up	engine	53-hp up
54-30	prop (Hegy)	{ 54-30 (climb) 50-40 (cruise)
17'8"	wingspan	18'
11'11"	length	12'10"
285 lbs.	empty weight	310 lbs.
265 lbs.	useful load	280 lbs.
550 lbs.	gross weight	590 lbs.
7 gal.	fuel	9 gal.
40 mph	liftoff	50 mph
500 fpm	rate of climb	850-1500 fpm
85 mph	cruise	110 mph
3 hours	range	3½ hours

Otherwise, the Teenie Two has all the features that made Jeanie's Teenie so overwhelmingly popular, especially the all-metal construction and the ease of building with common hand tools such as hacksaw, tin snips, file, plastic-headed hammers and Pop riveter. Materials, like sheet aluminum, extruded

TEENIE TWO COCKPIT has stick at right, throttle at extreme left. Instruments (from left to right) are: tachometer, airspeed indicator, compass, oil temperature gauge, altimeter and oil-pressure gauge



TEENIE TWO AIRFRAME, showing rounded bulkheads, 6-foot wing center section, can be built in any small workshop. Two sections of wings are attached to the center for flying, removed when plane is trailered

angles, tubing and even the engine can be purchased over-the-counter almost anywhere.

The biggest boosters of Jeanie's Teenie are the men who have already built and flown their tiny aircraft. Almost without exception they say they were attracted by the all-metal construction, ease of building and low cost.

The majority of amateur-built aircraft are made of wood and fabric, because few amateurs have the knowledge or the equipment necessary to handle metal. Parker's design was a real breakthrough because it showed an inexperienced man how to cut and shape metal without expensive equipment. And an all-metal airplane, theoretically, should last indefinitely.

Almost all JTs were built for under \$1000, a price where most amateur aircraft, including simple wood-and-fabric designs, start. The engine is the biggest item.

All the original promises made in *Popular Mechanics* have held up well. Teenie Two should do even better. What was good in Jeanie's Teenie is still there. What could be improved has been improved.

If you liked the original Teenie, you'll like the new Teenie Two even more. If you didn't try the Teenie first time around the new one will be harder to resist. If you try it, the same reminders apply: Build it carefully, and fly it wisely and it will give you years of enjoyment.

★★★

Lots of Class for Bass

By GEORGE REIGER, Boating Editor

Photos by Jerry Imber
Cypress Gardens, Fla.



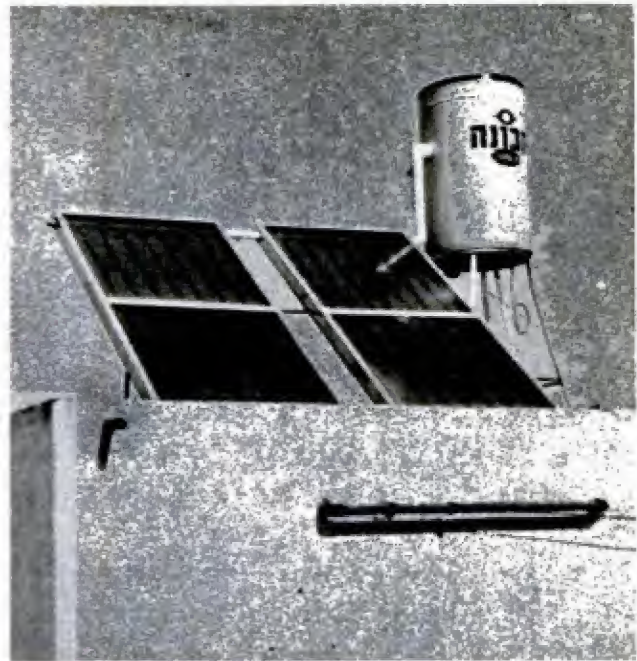
DELHI'S NEW FISH-N-SKI BOAT performed well when cruising or cornering at high speeds (above) and provided a steady platform for Dave Vigren and me (below) when we stood and moved around to fish. The 16-foot Fish-n-Ski is made by Delhi Manufacturing Corp. in Delhi, La. The boat retails for \$1130

RECENTLY I spent an afternoon in Florida fishing with friend Dave Vigren in Delhi's new Fish-n-Ski. *PM* was the first national publication to evaluate the bass boat phenomenon (*The Perfect Bass Boat*, page 113, Feb. '70), and a Delhi boat had been our star performer. So I was curious to see what else was happening with this popular breed of boat—part canoe, part jon boat—at Delhi.

The hull was still true to bass boat lines and stability, and we found nothing to complain about in the Fish-n-Ski's ability to cruise over submerged snags, corner at high speeds, or remain platform steady when Dave and I stood and moved around to fish.

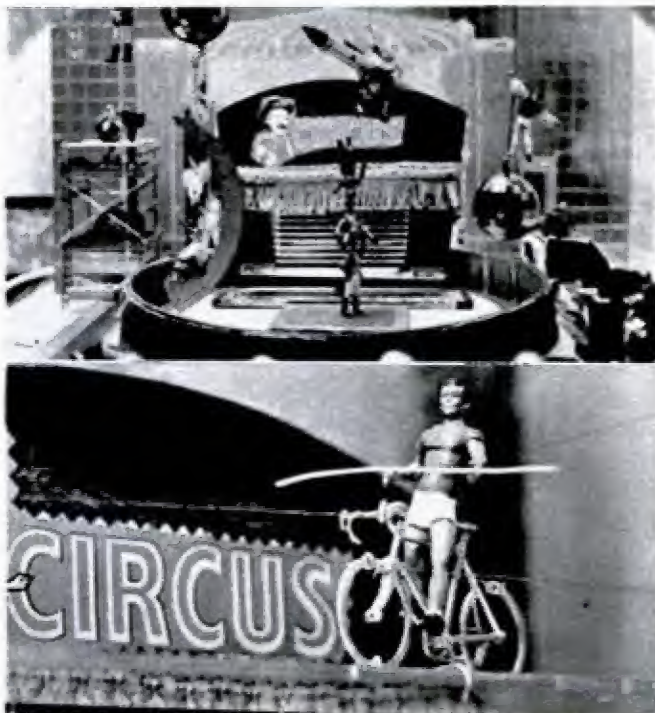
Our disappointment was with the amenities added to make it a family ski boat: back-to-back lounge seats, console steering—such luxuries cause a serious-minded angler to grind his teeth. But if you have youngsters who'll be cruising and skiing when you're not fishing, you'll probably find Fish-n-Ski an admirable compromise. ★★★





Rooftop water heaters use solar energy

When electricity was in short supply several years ago, many Israelis turned to sunlight for the energy to heat water. Despite the fact that there's no longer a shortage of power, many homeowners and apartment owners still prefer to use their solar-energy heaters, and the devices (above, right) stand on roofs of many buildings. Water circulates from a tank through pipes in two panels that absorb the sun's heat. Then it returns to the tank. At left, a worker packs insulation around a small storage tank.



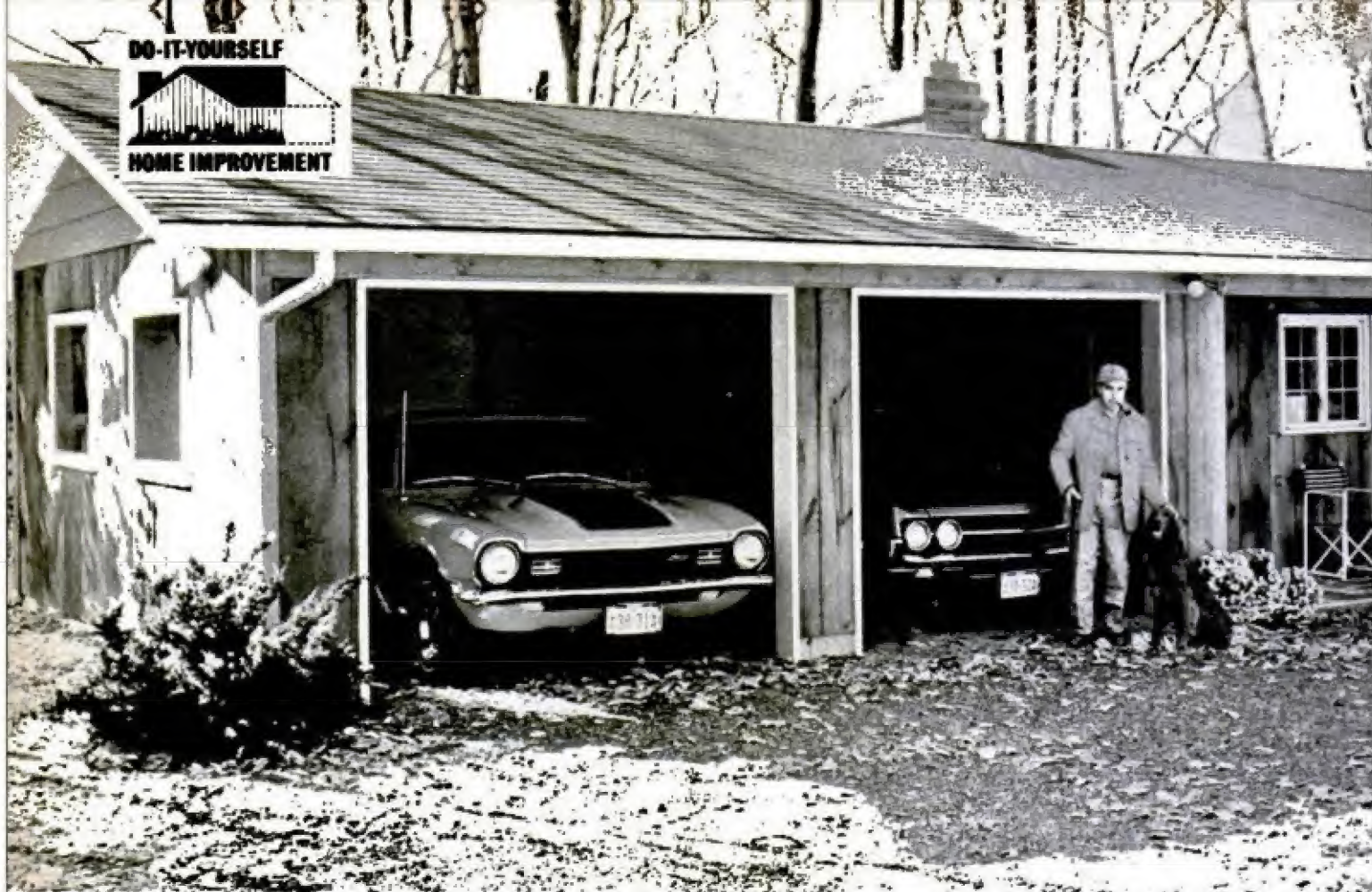
He has a circus in his living room

Concerned that his children were growing up at a time when big circuses had all but disappeared, Roy Gumbrell of London decided to bring the big top into his living room so they could see—at least in miniature—what circuses were all about. The quest for performers, animals and equipment lasted about two and a half years, and he added another 500 hours of constructing, painting and animating. Now the Gumbrells can watch an animal trainer work on a revolving platform (right), followed by such acts as a cyclist on a high wire (left). Other performers include jugglers, acrobats and a complete band.

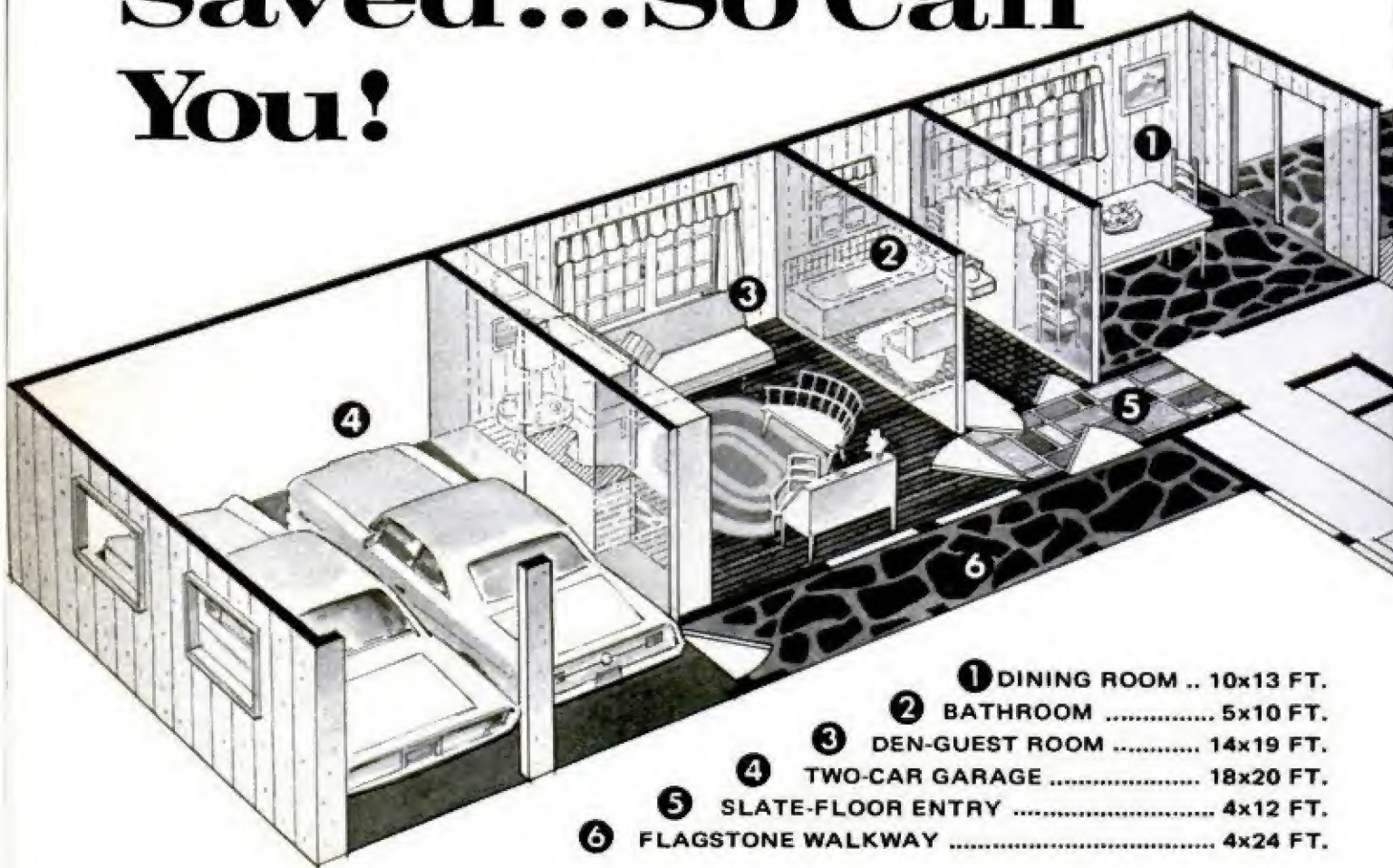
DO-IT-YOURSELF

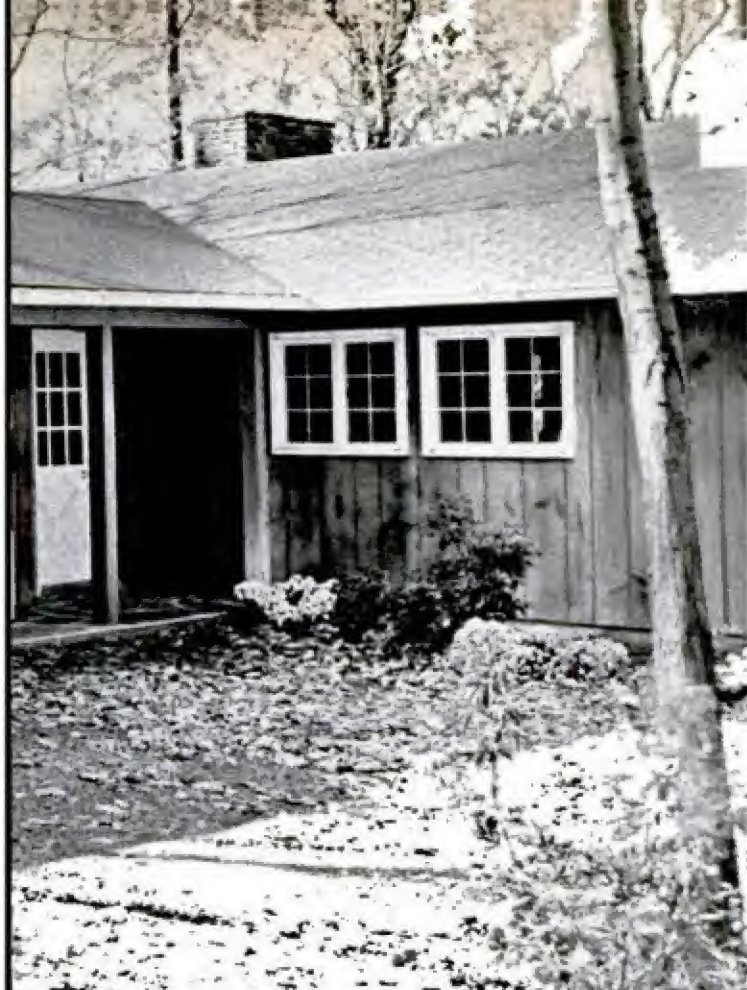


HOME IMPROVEMENT

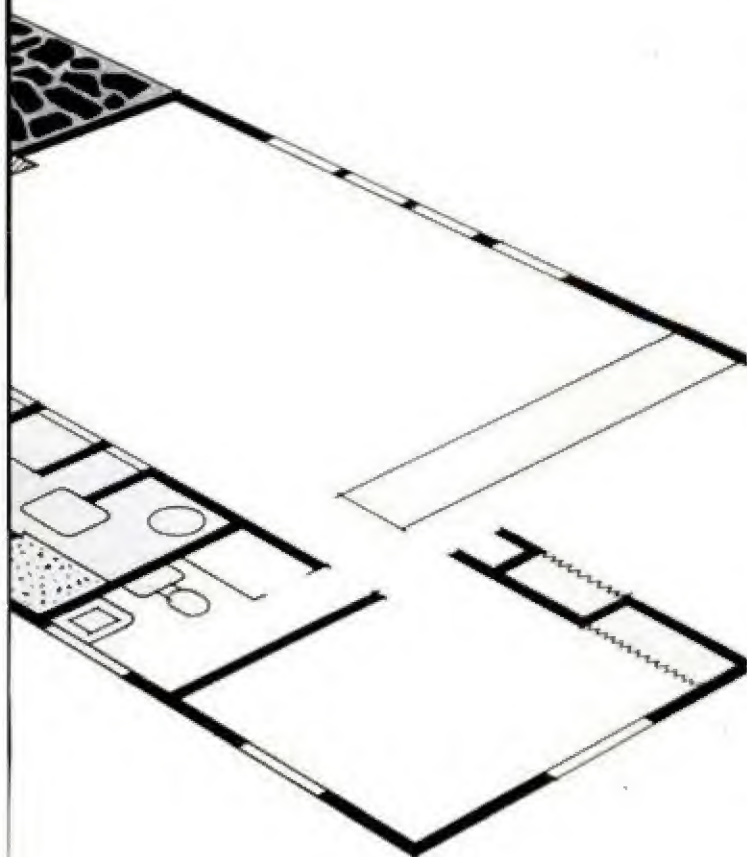


We Added On and Saved...So Can You!





L-WING ADDITION (above) extends at right angle from porch end of original cottage. What it did for our living space is shown in diagram (below) and in color photographs on the next two pages. The *PM Precut House* (page 113, March '55 *PM*) I started with is at lower right. New wing is from far end of porch



Our house grew a new den, dining room, bath, entryway and two-car garage. Cost: \$6035 in materials — and 54 weekends.

By RICHARD F. DEMPEWOLFF

Color Photos by Ernest Silva

Photo Direction by Robert Lofgren

SIXTEEN YEARS AGO this month, *Popular Mechanics* put me to work designing and building the prototype of what was to become the *PM Precut House*. It was a four-room and bath, low-cost (\$3800 in 1955 for all materials) vacation home boasting 1000 sq. ft. of living area.

That test house, built in Pennsylvania's Pocono Mountains, proved out. Four regional fabricators were contracted to assemble and market the magazine's Precut House Kit. Blueprints (still available), a book of instructions (out of print) and a series of articles (beginning in March '55) were published. Nearly 1000 of the kit homes were erected by *PM* readers. Several thousands more went up from the plans alone, including my prototype. The latter has served my family well for 15 years of weekends and holidays. And several annual meetings of *PM* editors were held in it during the early '60s.

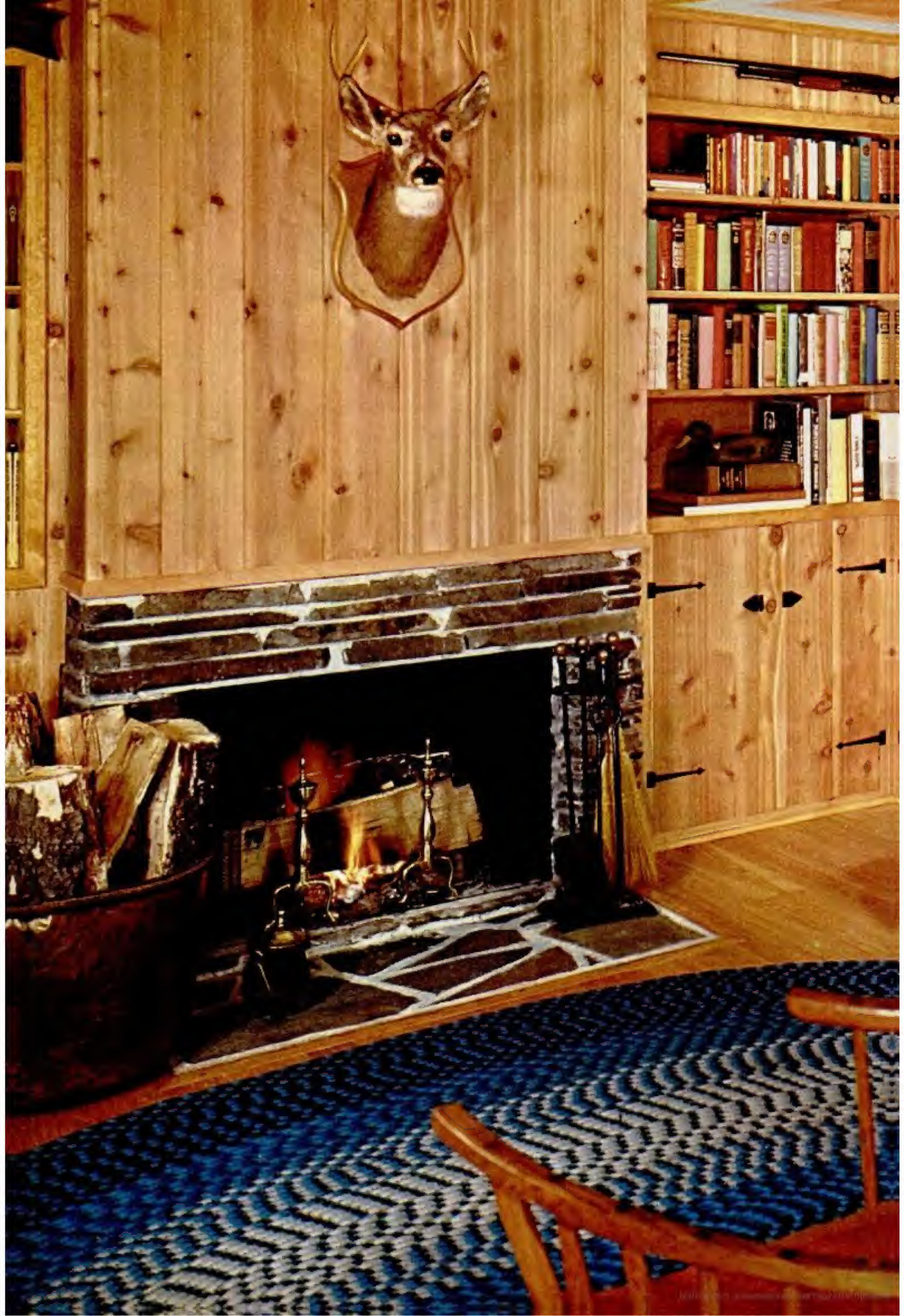
But as our flow of guests grew, the squeeze was on. We needed more space and a shelter for cars and storage. Furthermore, since winter weekend visits became more frequent, our hideaway needed central heat.

Thus, we were faced with two choices: We could (1) sell the *Precut House* and build something more commodious elsewhere, or (2) find a way to add onto the existing house.

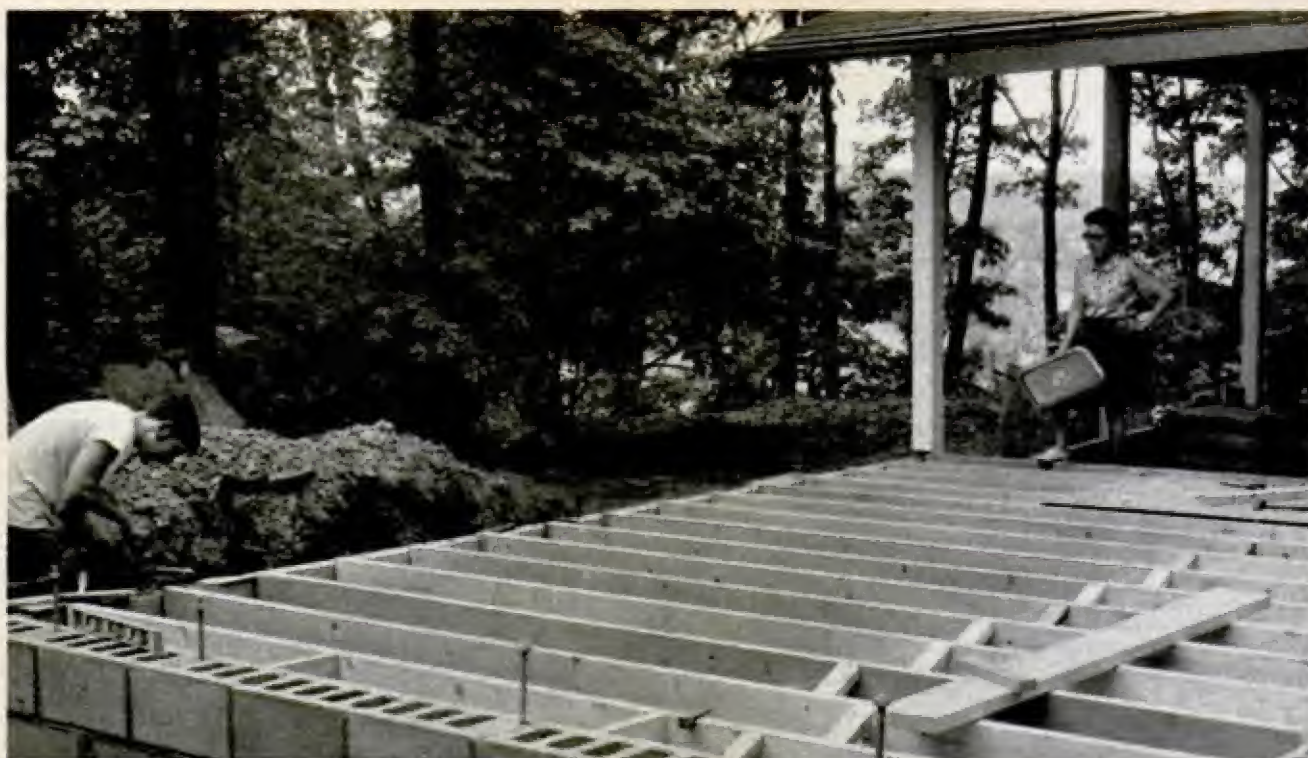
A breakdown of costs of each alternate revealed that an "L" wing would provide what we needed for approximately half of the cost of a new home with the same

(Text continues on page 108)









FLOOR JOISTS ARE SUNK into foundation wall and rest on a sill along ledge formed by top course of 4-in. block. This, plus use of 7-ft. 9½-in. sidewalls, permits using standard 4x8-ft. panels for siding

facilities—even allowing for the money we'd net after selling the old one. This assumption was based on the fact that I'd build the wing mostly by myself. A new house, on the other hand, would have to be largely contracted; I figured I couldn't run up 2000 sq. ft. of building working alone in less than four or five years of weekends.

So the wing won—as it would for most people in these days of soaring costs. The

interesting thing is that such an extension can be added to almost any house of one or two floors if the land to put it on is available and meets code requirements. The important factor is to make it look like part of the original structure and not a "tack-on." Thus the roof design and pitch must be carefully considered. If they follow the original, you're safe. On most homes, and especially those with shallow pitch or flat roofs, an "L" may even im-

WALL SECTIONS ARE assembled and joined on the subfloor decking, then tipped up into final position

FIBERBOARD SHEATHING PANELS are snubbed against rafters, fastened with 2-in. galvanized nails



prove the building's appearance by spreading it out and blending with the landscape.

Using 1969 retail prices at the R. C. Cramer Lumber Co. "Cashway" in Stroudsburg, Pa. (Eastern producers of the original kit), we estimated a total cost for materials of \$5500. The wing was begun in the spring of 1969 as a weekend and holiday project. It was completed, and final bills paid, in October 1970. For an actual materials cost of \$6035.42, we gained an additional 972 sq. ft. of enclosed space, including:

- A cedar-paneled dining room (page 107, lower right) occupying half of a former covered patio in the original ranch-type house. The flagstone deck was left as a handsome floor, filled with sealer and polished with Butcher's wax. A 6-ft.-wide sliding glass door faces the remaining half of the patio which overlooks a spectacular mountain view.

- A full bath lined with gray fiberglass barn siding. Fixtures are white for contrast. The tub stall is walled in gray Parkwood epoxy panels to shed water from the shower head.

- A den-guest room (pages 106-107) paneled in natural cedar, with built-in shelves and cabinets flanking a packaged fireplace. The floor is waxed, random oak planking. A sofa bed against the rear wall accommodates a weekend guest couple in roomy comfort. The room is my "branch office" when we're alone, and it could be-

come a luxurious master bedroom should we ever want it.

- A two-car garage that could be stretched to 20x20 ft. by extending the rear wall out under the 2-ft. roof overhang if you're a "big car" fan, or want to install a workbench.

- A redwood-paneled entryway, with random slate-flag floor from which country mud and slush are readily cleaned. Backing into the bath area from this hall is a 26x34-in. coat closet with shelves and bins for boots, storm lamps and the like.

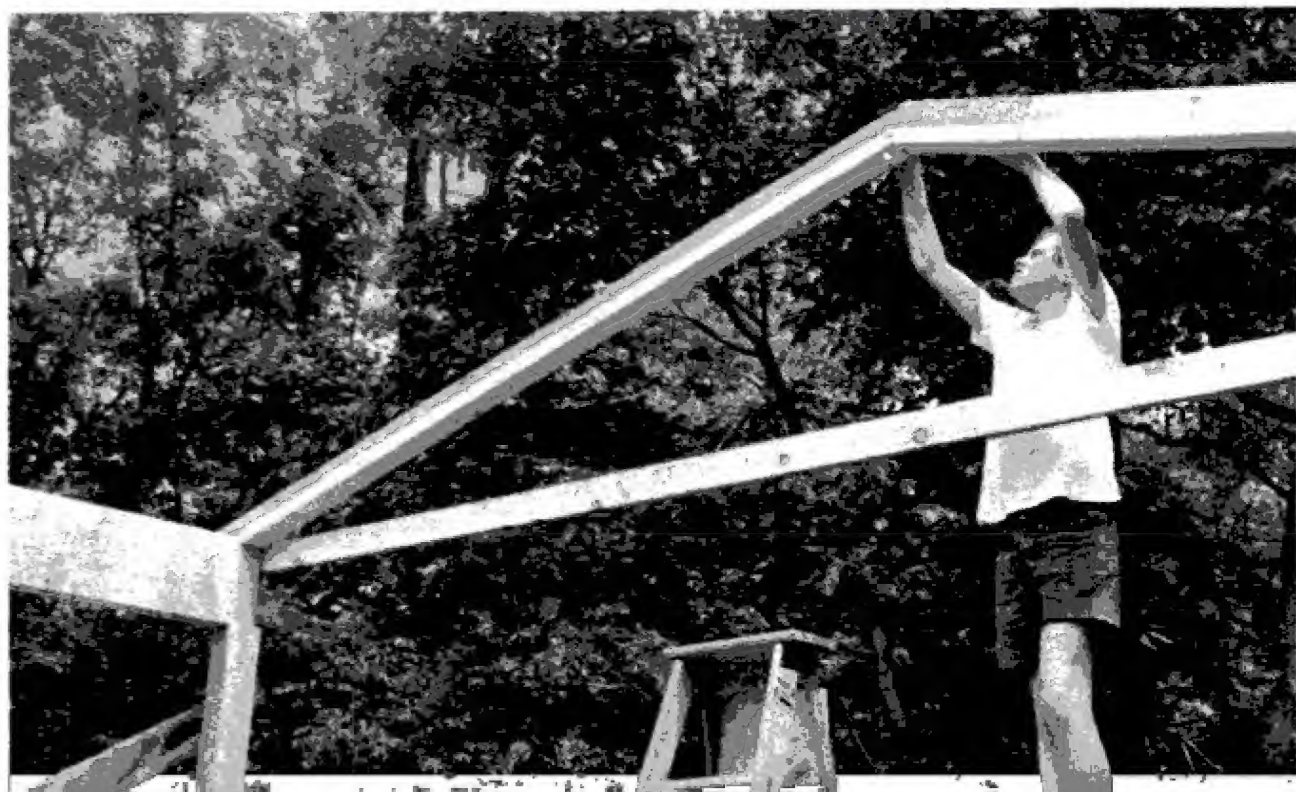
- A 4-ft.-wide covered walk outside, paved in random flagstone and paralleling the entry hall between the house entrance and a door leading into the garage.

- An oil-fired, hot-air heating system that provides balanced heat throughout the building. Since both original house and wing sit on shallow bedrock over a tight crawlspace, the problem of a proper furnace seemed rough at first. It was easy. Most manufacturers, we discovered, produce "horizontal" furnaces designed to fit beneath floor joists where clearance is as little as 2 ft. Plenum and ductwork come off one end.

How long did it take to put all this together? Ground was broken on April 19, 1969, and the structure was finished by Oct. 15, 1970. Two months of weekends were used up, however, replacing windows in the original house to match those in the new wing, and resurfacing the original

(Please turn to page 187)

GABLE END RAFTERS are cut and assembled on ground, then lifted into place and braced. Care must be taken to insure peak is exactly same height from bottom cord as trusses. Studs can be cut to fit afterward





Products to Make Your Job Look

By RICHARD F. DEMPEWOLFF

WEATHERED BARN-SIDING PANELS made of fiberglass are trimmed with portable circular saw (above). Inset shows detailed texture of the product. The seams are sealed with an epoxy cement and coloring that are provided in the kits

FIBERGLASS "ANTIQUE BRICK" (below), readily cut with the electric saw, is used to hide unattractive block chimney. Precut slate flagstones (left) are laid in mastic directly on a wood floor, then are sealed and finally buffed in wax



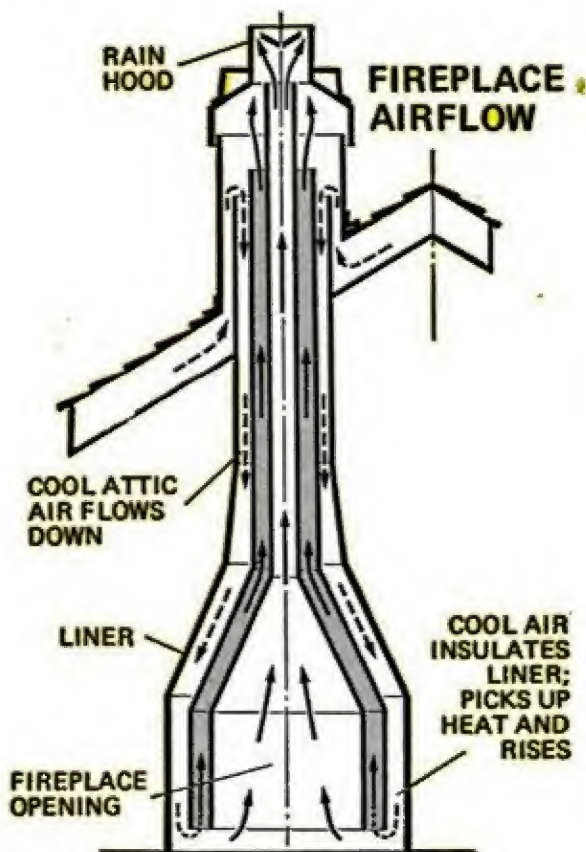
IN THIS AGE of "instant" everything, it isn't surprising to find a growing number of home construction products ready-made for the do-it-yourselfer—instant masonry, instant weathered siding, instant flagstone floors, instant fireplaces and the like. Such materials save time. They also can provide a finished, far more professional-looking job than an amateur could hope to produce by conventional, time-consuming methods.

I used as many of these products as I could when I added a wing to my vacation house (page 104). Here's a roundup of them, plus a list of the manufacturers.

On the *PM House* wing, the exterior siding and many other areas calling for brick or stone masonry were veneered with a unique, weatherproof, fire-resistant fiberglass product called Cavrok. As in all Cavrok patterns, the "weathered barn siding" I used has a built-in color that never needs paint. Deeply textured, it comes in 4x8-ft. panels. The material is cast in foam-rubber molds taken from the products they simulate—bricks, cut stone, field-

(Please turn to page 188)

Professional



MAY 1971



HORIZONTAL FURNACE, designed to fit the 24-inch clearance in tight crawlspace, puts out enough B.T.U. to heat an eight-room house in the coldest climate



PACKAGED FIREPLACE (below) can be set on a wood floor, backed against a flammable wall with no fire hazard. Triple-pipe flue (above) is cooled by air



CUTAWAY OF FIREPLACE ASSEMBLY (left) shows how the circulation of cool air between two layers of steel provides insulation for the outer surface

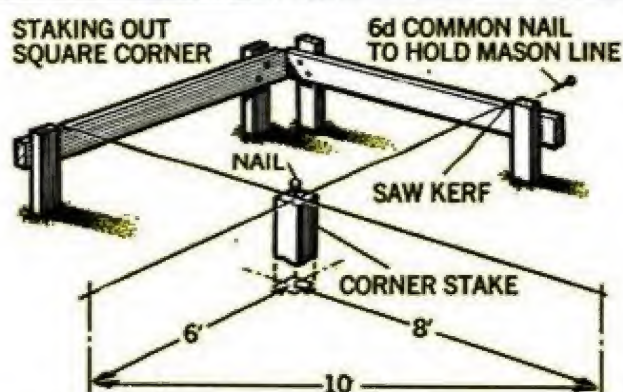
BUILDING A HOUSE?

20 Tips That Save Time and Your Back

When I added the wing to my home, I decided to pick the brains of local pros to find easier construction techniques. Here are the best

By RICHARD F. DEMPEWOLFF

Technical Art by Peter Trojan



1 LEVELING LINE stays in place if notches are sawed in batter boards to accept the mason line. Bottom of notch should be level with top of stake. You should use 6d common nails to anchor line. Use 6, 8 and 10-ft. method to insure square corner



2 CONCRETE BLOCKS (and chimney blocks above) should be dampened thoroughly with water prior to placement. In cold weather, masonry can be protected by covering with felt or burlap. Both tricks assure superior adhesion and long-lasting strength



3 VENTING FOR CRAWLSPACE is provided by flopping cement block 90° and recessing it 1 in. for antipest screen frame. Number of ventilators to use is determined by crawlspace ground area. Total (net) free area of ventilators should equal 1/60th of ground area. Use louvers to keep out rain



4 SILL PLATE is anchored with 1/2-in. bolts spaced a maximum of 8 ft. apart with hooked end of anchors embedded 8 in. or more. If shims are necessary to level the sill, use pieces of slate and a slush mix of mortar. The concrete blocks should be filled with mortar before sill is placed in position



5 ROOF TRUSSES are preassembled and go up easily with just two men. Author found that having the trusses built at local lumberyard saved him time on the job and was relatively inexpensive



6 SIDING FOR GABLE END requires a 4 in 12-in. pitch. To get it, a framing square is positioned with the 12-in. mark on the body and 4-in. point on the tongue along the edge of the sheathing plank



7 CONNECTING HEADERS are tied into existing house after you cut hole in the overhang large enough to swing a hammer. Shingles are trimmed as shown. When roof is finished, overhang is cut away



8 MIDPOINT BLOCKING, which gives wall added strength and rigidity, will go quicker if it's staggered for easy nailing. Blocking provides additional nailers for planks which will be finish wall



9 INSULATION used comes precut in 8-ft. lengths; flanges are stapled on face of stud to provide proper vapor barrier. Use insulation at least 4 in. thick on walls, 6 in. thick between ceiling joists

MAY 1971



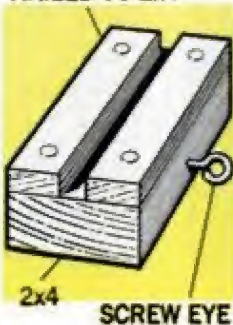
10 WARPED PLANKING yields quickly when it's tapped; use hammer and groove-edged scrap the same material. To nail planks, start at one end, fasten to blocking and finish nailing at other end

113



HOLDING BLOCK

1x2 STRIPS
NAILED TO 2x4



2x4
SCREW EYE



11 BIG 8 x 14-FT. PANELS of Upson Board fit through the 7-ft.-high door opening when force-bent as shown. Blocks (see drawing, above right) connected by cord make material easy to handle. The oversize panels cover entire walls, eliminate seams and are halved for use on ceilings

12 LARGE PADDED T eliminates having to hold unwieldy ceiling panels while a partner drives nails home. For a wedge fit, build the T so that overall length is slightly greater than the floor-to-ceiling height



13 FALSE BEAMS (left) hide ceiling-panel seams, are fastened with lagscrews into ceiling joists. Counterbored holes provide clearance for a ratchet wrench, are later doweled and sanded flush. For a finish, apply a stain and two coats of varnish or lacquer

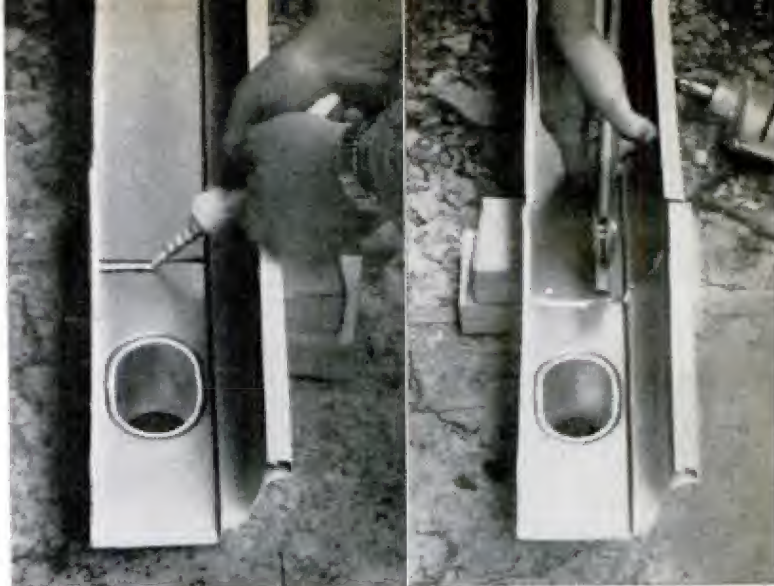


14 LADDER BRACKETS rented from building supply house provide a work platform you can set up much more quickly than scaffolding. As chimney goes up, it's a simple one-man task to raise planking with it

15 DROOPY SHINGLES along an edge can be eliminated by installing a starter course of cedar shingles (No. 2 grade). Easy-to-follow line is simply fastened to a nail driven at each end of the addition



16 ROOF RIDGE is topped with a finish method called Boston ridge. Each piece (one-third of a 12x36-in. asphalt shingle strip) overlaps the next about 6 in. The job is easier if you first cut a batch of shingles on the ground. If driving rains are likely, put a ribbon of asphalt under each lap

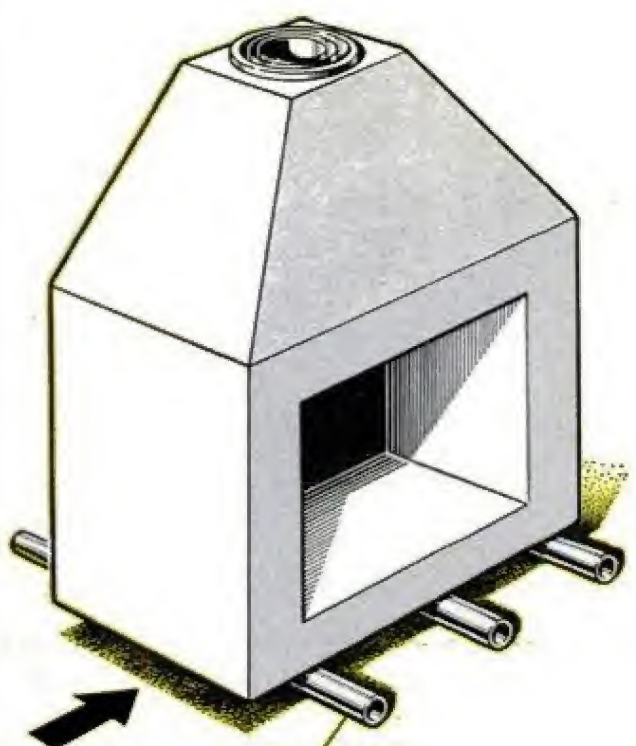


17 GUTTERS are quickly installed without the use of conventional connectors and the like. Joints are simply overlapped and a bead of silicone caulking applied. To finish, each joint is permanently connected using a Pop RiveTool, four rivets



18 RANDOM FLAGSTONE forms surface of the covered walk at front of home. Pieces are positioned along walk and, when design is satisfactory, finally are laid in mortar on actual walk area

19 WALK between front door and garage should be pitched a minimum of 1 in. to provide a positive runoff of rainwater. Piece of 1-in. (actual) stock under outboard edge of straightedge makes this quick and easy to accomplish with level



DIRECTION OF MOVEMENT

PIPE ROLLERS

AS UNIT ROLLS OFF PIPE, MOVE PIPE TO LEADING EDGE

20 PREBUILT FIREPLACE can be rolled into place single-handedly with help of several pipe lengths. When fireplace is positioned, use lever and fulcrum to raise it so the pipes can be removed

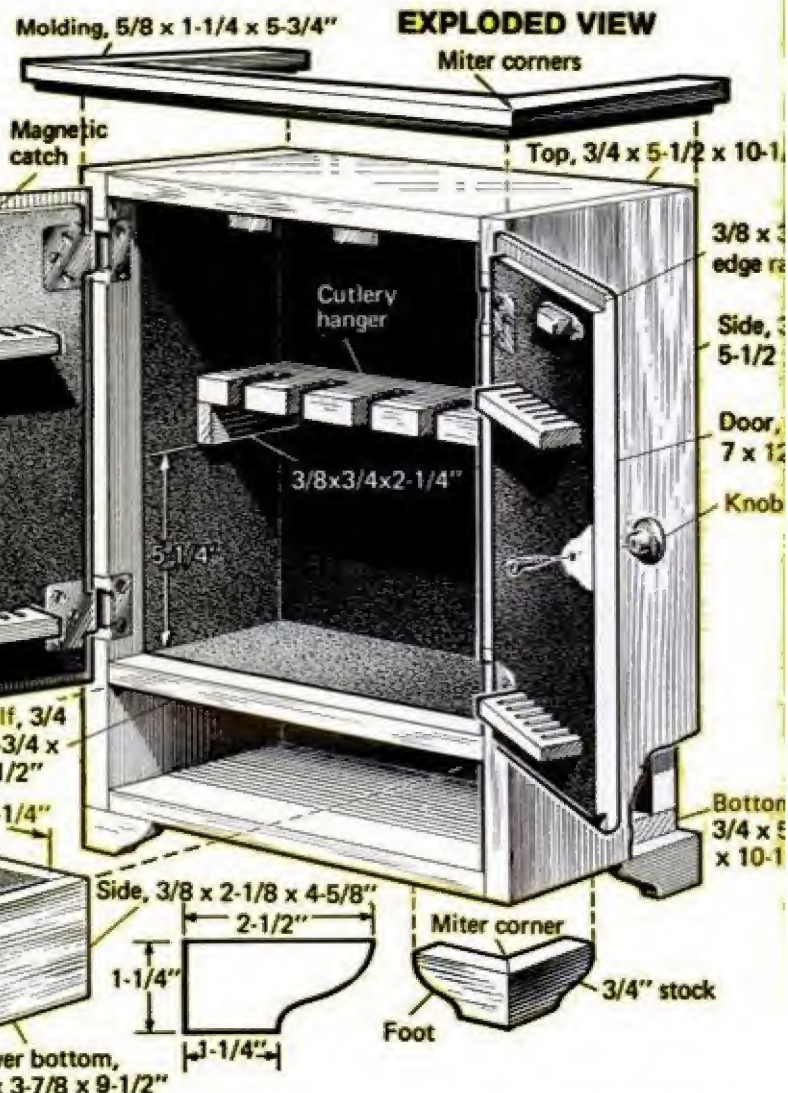
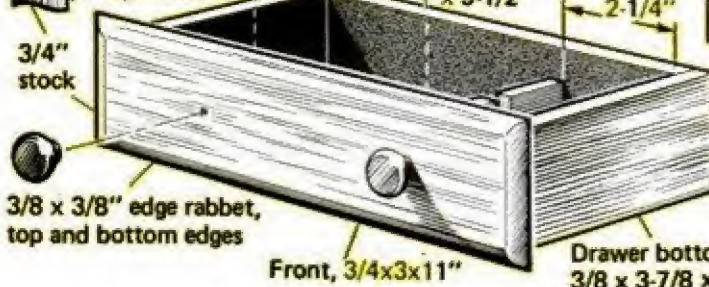
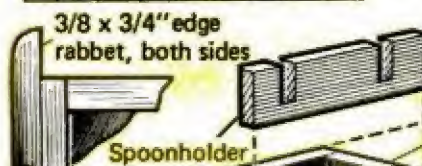
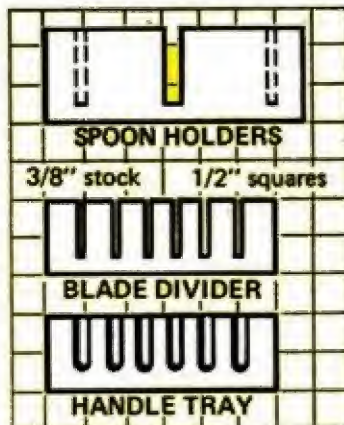
Quickie Projects for

Colonial Cutlery Cupboard

If you've been looking for something a little out-of-the-ordinary to build, this version of an Early American cupboard can easily fill the bill. Though the one shown is constructed of spruce and finished with a fruitwood stain, you may prefer hardwood. It just means the project will cost slightly more to build.

Before you start, decide exactly which cutlery your wife will want to store in the cupboard. Then you can alter dimensions before making any cuts. Equally important is the location of the knifeholders in the cupboard and drawers. Your inventory may vary somewhat from ours, so some adjustments may be necessary here too. Use your favorite finish, but a tough varnish is probably the best choice.

—Elma and Willard Waltner, Freeman, S.D.



the Fun of It

A Real Puzzler

With this intriguing little puzzle you can compete with yourself or friends to find the fewest moves—or shortest time—you need to reverse positions of the words “black” and “white.” It’s not too frustrating when you have unlimited moves; the real skill lies in your ability to effect this change in as few moves as possible.

Make the cubes first, then build the box to fit. From a strip of $\frac{3}{4}$ -in. square stock saw off pieces just a little over $\frac{3}{4}$ in. long. True the cube ends square (and to length) using a bench disc sander or with a similar setup mounted on the lathe.

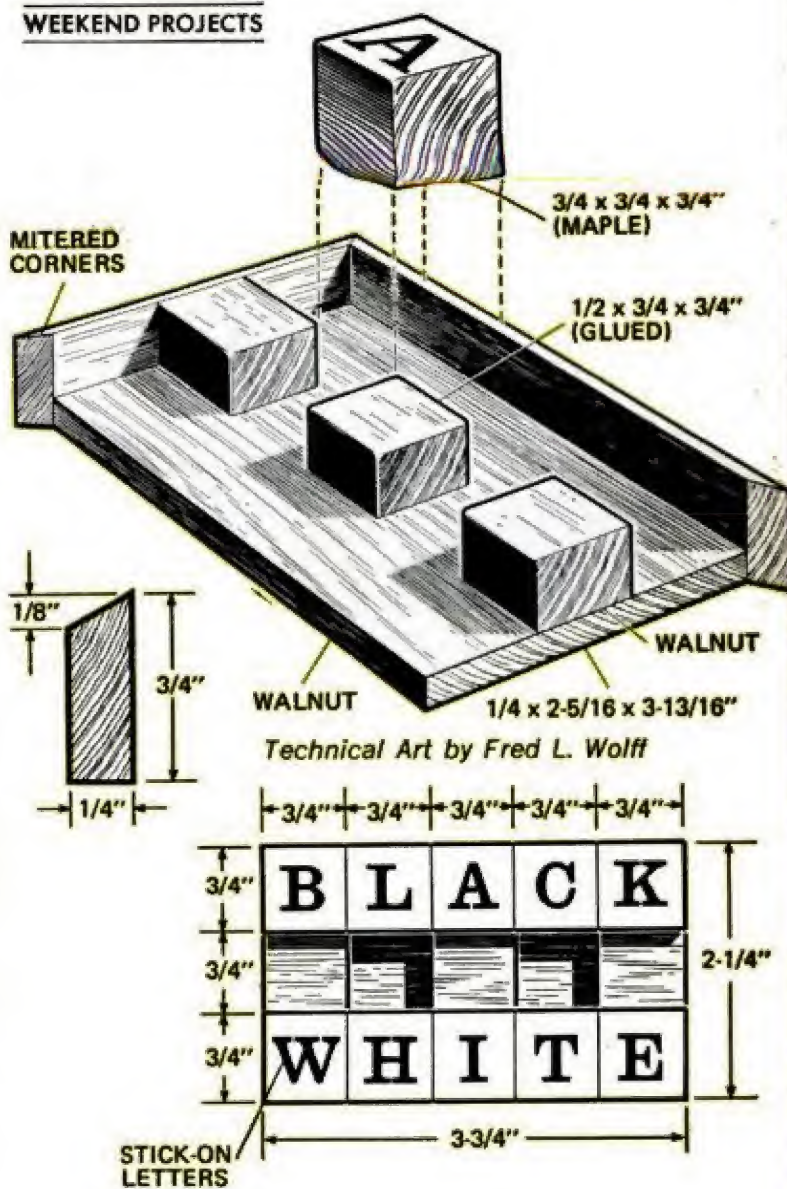
To obtain the inside length of the holder place five cubes together, measure the overall length (it should be approximately $3\frac{3}{4}$ in.) and add $\frac{1}{16}$ in. Measuring three of the cubes plus the tolerance gives width. Miter the holder sides and hold them with masking tape during gluing. When dry, fit and glue in the bottom and the three fixed blocks. Holder can be finished with two coats of sealer or shellac polish.—*Kenneth Wells, Portsmouth, Hants, U.K.*

TO SAND CUBES, disc of wood with garnet abrasive glued on face is mounted on lathe faceplate



MAY 1971

WEEKEND PROJECTS



CUBES SLIDE FREELY if parts are finished carefully. Trick is to reverse words with minimum number of moves

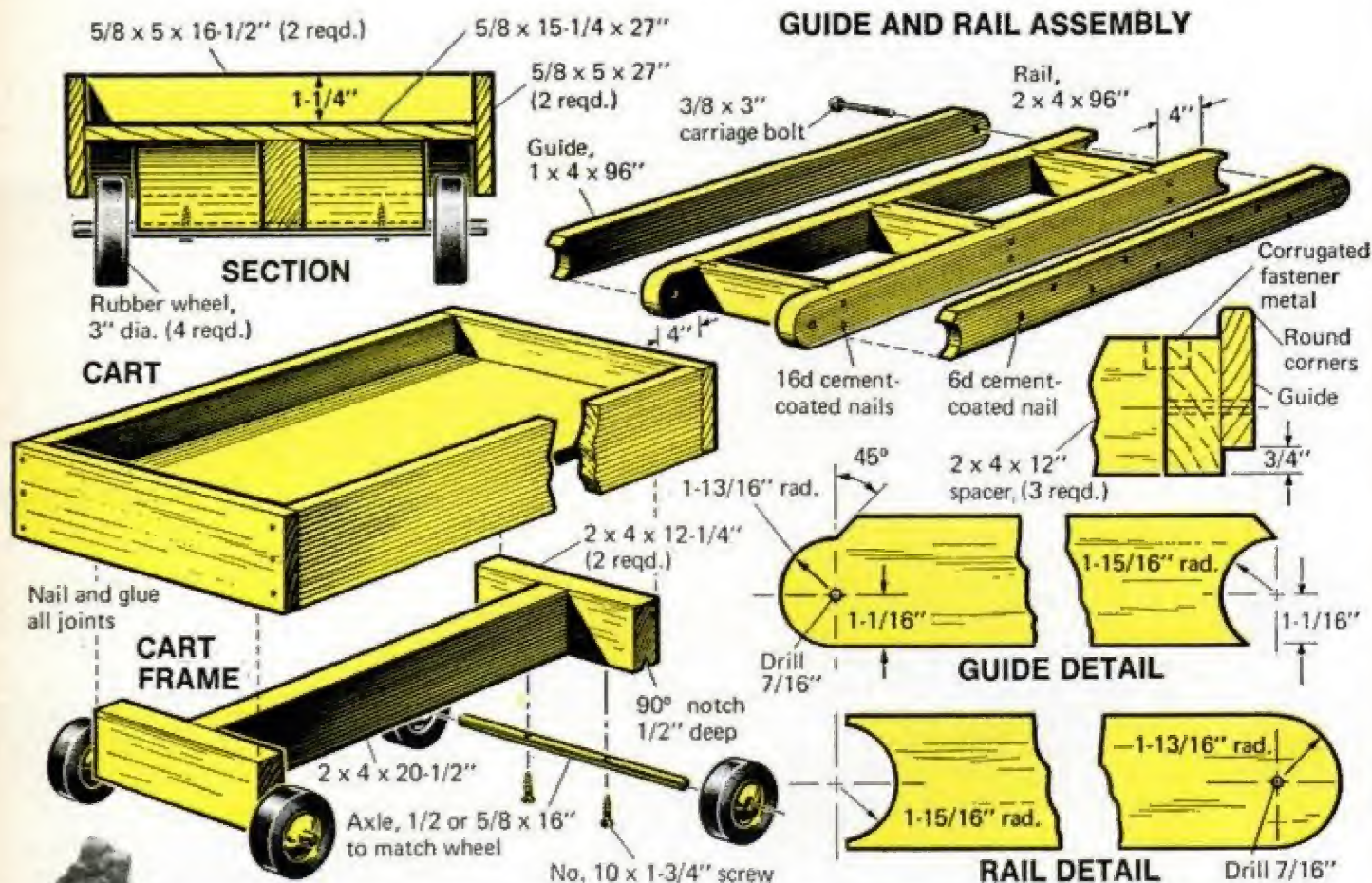




Back-Yard Roller Coaster

You can bring a touch of old Coney Island into your back yard by building this simple roller coaster. The wood rail sections can be propped up with boxes or, for a more permanent arrangement, secured to posts planted in the ground. Notice that sections are pivoted together with bolts so that the entire set-up can be quickly disassembled for relocation or storage. There's no limit—except for available yard space—as to how long the coaster can be.

Wheels fit between the guides to keep the cart on the rails. Here is where accuracy is a must. To be safe, build the roller assembly first and then measure for wheel placement so there can be no side wobble. An old rug at the end of the run makes a good brake for stopping. Simply roll it around the last rail tie.—R. S. Hedin, Minneapolis

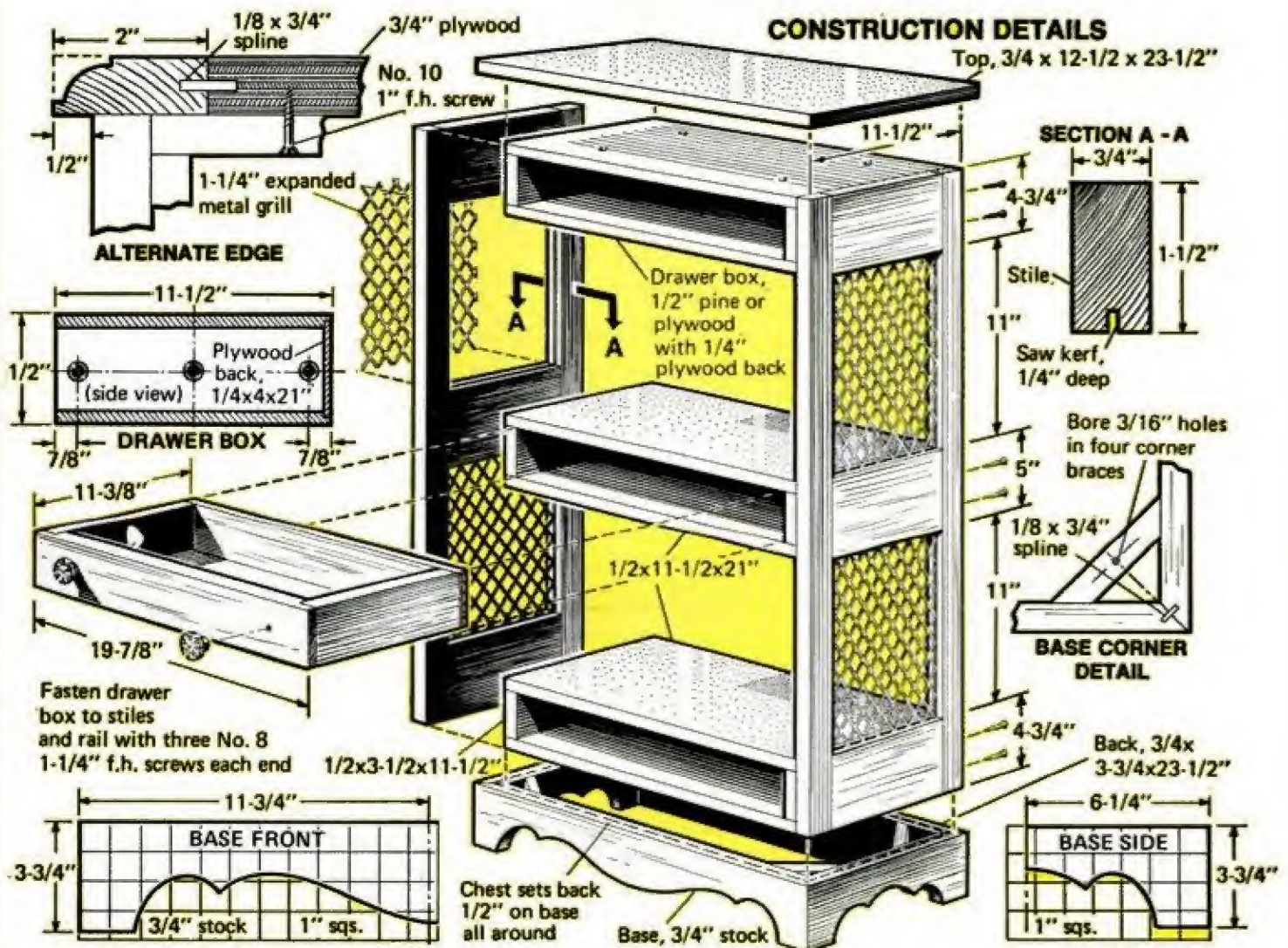


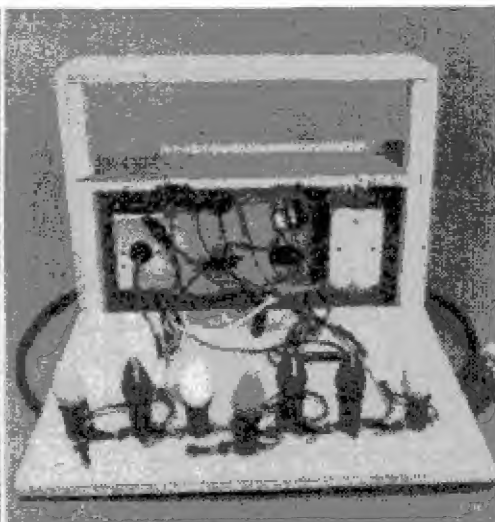
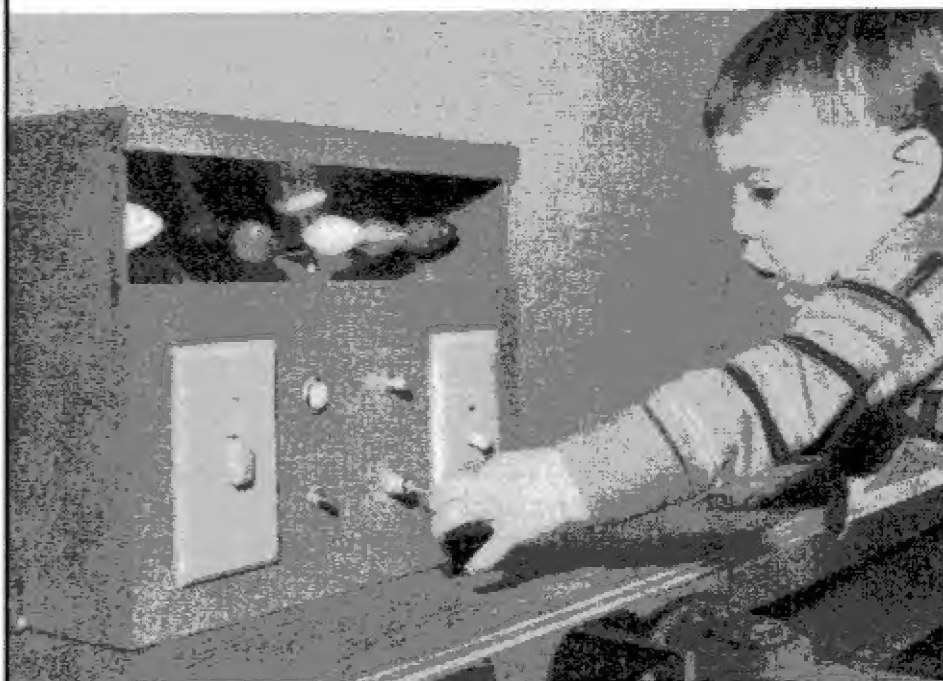
Bookshelf-Occasional Table

Painted white, fitted with gold drawer knobs and its "sides" made of expanded metal grill, this table lets you get away from the usual stain-and-varnish type of project. The table is built of standard materials sold at any lumberyard. And if you are lucky, as I was, you'll be able to glean the expanded metal from a local sheet-metal shop's waste bin.

Make the drawers first. Then should your measurements vary somewhat from those in the drawing, you can adjust the table measurements to insure a neat job. I used $\frac{3}{4}$ -in. fir plywood wherever possible and covered all exposed edges with Weldwood tape. Since fir has a tendency toward a wild grain, it is important that the piece be thoroughly sealed before it is painted; otherwise the grain will show through the finished surface. Because this table was to stand in a spot where it would be subject to a certain amount of abuse, I plastic-laminated the top.

—C. L. Widdicombe, Ontario, Canada





CHRISTMAS-TREE BULBS work perfectly in switch-box toy; they are small and are available in a variety of colors

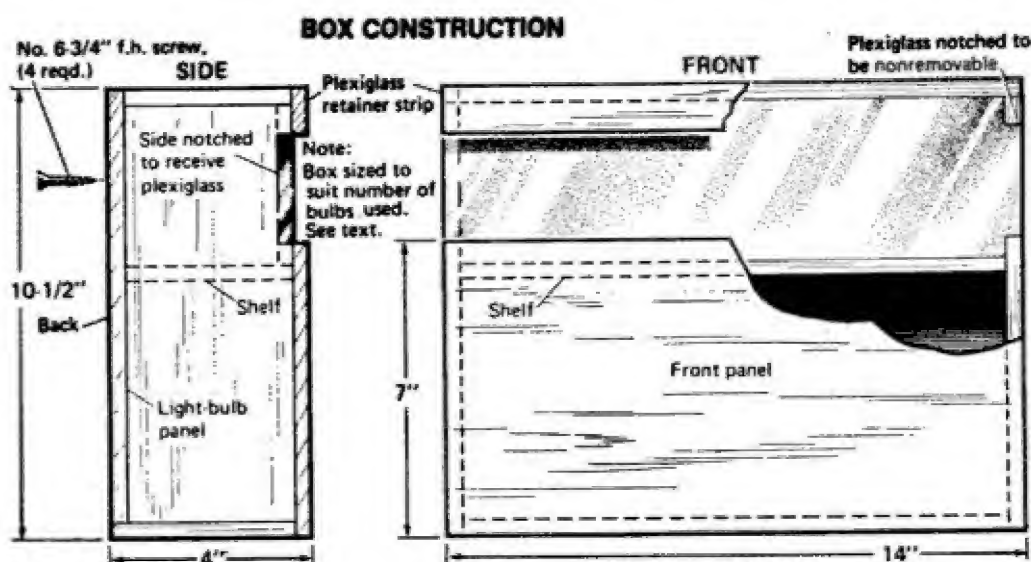
Toy Teaches Toddlers All About Switches

Since her first birthday, one of my daughter's favorite pastimes has been coaxing someone to lift her so that she could reach an electric switch and turn it on or off. Her curiosity is what prompted this toy project. While I was designing it, I decided to employ a variety of switches—both to stir her inquisitiveness and increase finger dexterity. For example, I used six differ-

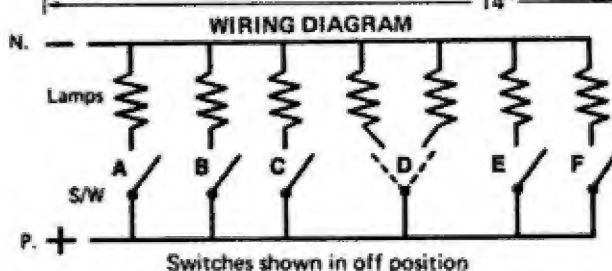
ent switches (one has two "on" positions), each wired to its own bulb. The number of switches is limited only by box size.

The important design feature is to make certain that construction is such that the toddler can't possibly get to the wires. Another tip: Use a different color bulb for each switch. Then you can also teach your toddler color recognition.

—James H. Pickerell, Bethesda, Md.



SIX SWITCHES USED in schematic (right) and photo (top, left) are: A) wall-type push-button; B) doorbell button; C) push-type lamp; D) three-position rotary lamp; E) pull-chain and F) wall-type toggle. Types can be varied depending upon what switches you have on hand



HINTS FROM READERS

Homemade tack puller

A handy tack puller that collects the tacks as they are withdrawn can be fashioned from an old tablespoon. Simply file or cut a V-notch in the spoon's tip and wrap several turns of tape around the spoon bowl. The space between forms the tack-receiving receptacle. You'll find the tool is particularly handy and easy to use.

—John Henry, Chicago



Chuck serves as pipe center

A tailstock drill chuck having a tapered cone can serve as an emergency pipe center for lathe work when the i.d. of the pipe is within the o.d. range of the tapered portion. In use, oil is applied to the taper. Small-i.d. pipe can be supported by the tapered jaws of the chuck. Here, jaws are fully closed and oil is applied as before.

—W. B. May, Oak Park, Ill.



Keep bearings from rolling about

To hold roller bearings in place while you reassemble a tackle pulley, coat the bore of the pulley with a thick layer of bearing grease and press bearings in position. The sticky grease will hold bearings in place until pulley is installed. For a lighter lubricant, immerse the tackle block in solvent to dissolve the grease a bit.—Hilbert Daniello, Phoenix, Ariz.

Impromptu 'workbench'

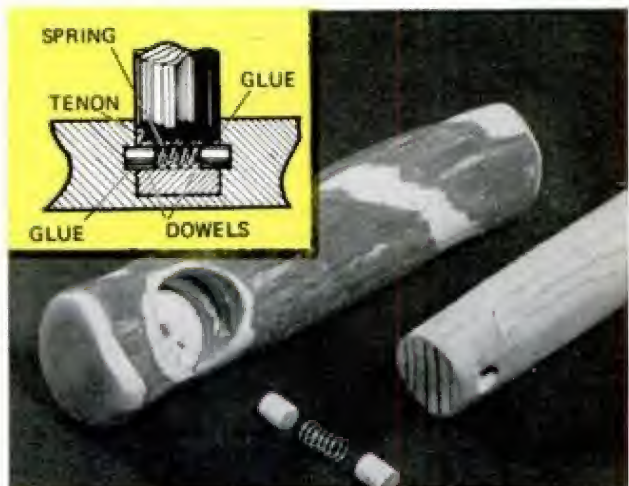
Recently, when I came across a good buy on a jigsaw, I discovered that it lacked a workstand. So, using an old washer I picked up at the local junkyard and a piece of $\frac{3}{4}$ -in. plywood, I improvised the stand shown. The sheet of plywood serves as a workbench at both sides and the whole unit can be rolled on its casters.—J. Krill, North Lima, Ohio



Hidden 'latching dowel' locks joint

Here's a simple way to add concealed strength to mortise-and-tenon joints such as those found in the "Tennessee" walking cane shown. As a joint is assembled, a coil spring centered in a tenon cross hole exerts outward pressure on two dowels, forcing them into recesses. The setup works like a door latch on a striker plate.

—Walter E. Burton, Akron, Ohio



How to Make Your Own SAFETY INSPECTION

By MORT SCHULTZ

RETIGHTEN TAILLIGHT LENS SCREWS carefully after replacing burned-out bulbs to prevent cracking lens

OVER ONE MILLION CARS in the state of New Jersey alone were rejected as unsafe by state vehicle inspection officers last year.

The equipment violations which caused their rejection were easy to detect, says Ronald M. Heymann, director of the Div. of Motor Vehicles. Defects included such things as burned-out headlamps, horns that didn't blow, nonworking turn signals and worn-out windshield wipers.

It is hard to believe that a million people would drive cars with such obvious defects—even take them to state inspection and expect to pass! These drivers could have done a thorough safety inspection themselves in less than an hour to be assured that faulty equipment wouldn't kill them or someone else.

To do your own inspection, start with lights. Check for burned-out headlamps, parking lights, front and rear side markers (if the car has them) and taillights. Be sure, too, that the license-plate lamp is working.

Remove a burned-out headlamp by taking off the bezel, unscrewing the lamp's retaining screws, pulling out the sealed beam and detaching it from the connector. Attach a new unit by reversing this order.

Headlamps that are part of a dual light setup are designated Type 1 (low beam) and Type 2 (high beam). Headlamps combining low and high beams in one unit are designated No. 6012 or Type 2, Single Unit.

Misalignment of headlights is one of the main reasons for cars failing state in-



SEALED-BEAM HEADLIGHTS are very easy to replace. The three-connector plug just slides onto the prongs



ADJUSTMENT OF HEADLIGHT in the horizontal plane on this car is made through hole near side of headlight. Vertical adjustment screw is reached through opening where top of the fender meets grille (arrow)



WINDSHIELD WASHER FLUID should be topped off in the reservoir. Remember to add antifreeze in winter
MAY 1971

spection. It is a serious hazard to safe driving.

Have a service station check the alignment of your lights, or do it yourself by using the patterns shown in your owner's manual. It is usual to place the car on a level floor 25 feet from a screen or wall on which you have drawn the guidelines of the pattern.

In most present-day models, you can reach headlamp adjusting screws without removing the headlight bezel. Earlier models, on the other hand, will require removal of the bezel.

To replace burned-out parking lights remove the lenses if they have screws or reach beneath the bumper if lenses don't have screws. A burned-out front side marker is reached from under the fender or by removing the lens if it has screws. Burned-out rear side markers and tail-light bulbs are changed from inside the trunk or by removing lenses if they have screws.

Step on the brake to make sure that the stoplights work. Then place the transmission into reverse and check backup lamps.

Test each turn signal and the hazard-warning flasher if the car is so equipped. If any signal fails to function, check the bulb first for a burned-out filament.

If the bulb is okay, pull it from its socket, which in most cars is somewhere beneath the dashboard, and replace the flasher. Check the car's service manual or *Motor's Auto Repair Manual* in the li-



HORN RELAY, being tested here, should be checked when horn doesn't work. Check switch, horn itself



EXHAUST SYSTEM JOINTS can be sealed from small leaks with coating of special exhaust-system sealer

TIGHTEN JOINT CLAMPS firmly, but do not overtighten, a practice that will distort or crush pipes



brary to determine the exact location of the flashers.

Check that windshield-wiper blades are in good condition, also that windshield washer fluid is up to the top of the reservoir. If it isn't, replenish it.

Use two parts of water to one part of washer fluid when the temperature is above 32°F.; below that, a ratio of 1 to 1.

By the way, if fluid just dribbles onto the windshield instead of squirting out strongly, remove the reservoir from the car, drain fluid into a clean container (it can be reused) clean off the strainer screen in bottom of the reservoir or on the end of the delivery hose, and replace fluid. Dirt on this screen will impede flow.

Blow the horn. If it doesn't work, pull off the connector at the horn, connect a test light to ground and probe the connector while someone pushes the horn button. If the test light glows, the horn itself is shot and should be replaced. If the test light fails to glow, the problem is probably a bad horn relay or a faulty horn switch.

Disconnect the connector at the horn relay and probe it with the troublelight as someone presses the horn button. If the light glows, the relay is bad. Replace it. If the light doesn't glow, the horn ring will have to be removed to determine the cause of the problem at the horn switch.

It is now time to inspect beneath the car. First give exhaust-system pipes and muffler an examination for holes and rust, and tap for a "sounding" to indicate how much metal is left.

Start the engine and examine all clamped exhaust joints for exhaust leaks from the exhaust manifold-exhaust pipe joint connection all the way back. Put your hand around each joint. If it's leaking, you will feel it puffing.

Loosen the clamp at a leaky joint and coat the joint with joint-connection sealer which you can buy at an automotive supply center. Slide the clamp back and tighten firmly, but do not overtighten.

If there is an exhaust leak at the manifold-exhaust pipe joint, the gasket is bad. Loosen bolts, remove the gasket, replace it with a new one, coat the joint with sealer, and tighten bolts securely.

If you can't make use of the lift at a gas station, lift the front end of the car



IDLER ARM (being tested) and the Pitman arm of your steering system should not have any looseness

POPULAR MECHANICS

WHEEL BEARING that is loose may have lock-adjust nut that has backed out. Tighten, check cotter pin

CHECK LOOSE WHEEL BEARINGS by jacking car and shaking tire. There should be practically no play



using two strong jacks, one on each side, and chock the rear wheels. Grasp each front tire and shake it. If either wheel is loose, a wheel bearing (or bearings) in that wheel is loose or worn.

Remove the hub and torque the lock-adjust nut to specification with a torque wrench. Check the service manual or *Motor's* for specifications.

Retest the wheel for looseness. If it is still loose, the bearings in that wheel (there are two—an inner and an outer) should be replaced.

Incidentally, you can't tell if a wheel bearing is damaged by spinning the wheel and listening for noise. However, if you hear a growl coming from a wheel as you drive the car—wheel bearings then have a

load on them—remove and inspect the bearings.

Now, check steering linkage for looseness. Specifically, test the idler arm, Pitman arm and tie-rod ends. Grab hold of each and shake. If there is any movement, the stability of the car will be affected, creating a hazard. Replace any worn part.

Another suspension component that affects stability is shock absorbers. Check for leaking fluid. If the steering wheel hops in your hands as you drive over bumps, suspect that shock absorbers are failing. It goes without saying that bald tires cause accidents. Don't drive unless they are in good condition.

The best way to tell if a car's performance is going to jeopardize safety is to test-drive it. If the car hesitates when you accelerate, if it stalls at traffic lights, if it doesn't have power to get you out of a tight spot—find out what's causing the problem and fix it.

Give the brakes a thorough road test. Hit them in panic several times. Does the car pull? Is the brake pedal spongy or pulsating? Do brakes make noise or do they lock? Does the brake pedal fade under pressure or is the pedal too hard? Any one of these conditions is reason enough to have the brake assembly pulled apart and repaired.

You can perform a formal safety check, say, twice a year. Even better, get the habit of anticipating trouble before it happens—just for safety's sake. ★★



CHECK TIE-ROD ENDS with vigorous pull. Check both rods (one on each side of car). Replace if loose



Make a Center Indicator For Lathe Work

Based on the lever principle, it saves time when you're centering work in an independent-jaw chuck or on a faceplate for accurate hole drilling.

By **WALTER E. BURTON** / *Photos by the Author*

ARATHER SIMPLE but highly useful instrument, based on the lever, goes by such names as "center indicator," "center tester," "center finder," "axis indicator" and "center-rest indicator." One of its important jobs is to save time in centering work in an independent four-jaw lathe chuck or on a faceplate, with respect to punch marks for accurate drilling of holes. It can also center work on an existing hole or bore or some other inside surface, check or center work on an outside surface (circumference), and check work between centers.

Such a tool is not difficult to make. Of the two shown, the simpler, pivoted-ring type is useful for centering punch marks that indicate hole positions. The somewhat more complicated ball-and-socket arrangement will center punch marks, too; it can also be used for center-

ing existing holes or bores for threading or further internal turning, and for centering work on outside surfaces.

A center indicator is essentially a lever of the first class, with its fulcrum considerably closer to one end than the other. It is mounted so it normally can swing freely throughout 360°, but for some uses it is desirable to reduce this freedom to a single plane—which can be done with a simple attachment on one of the instruments described. The fulcrum support is mounted firmly on the lathe carriage—usually clamped in a toolpost or toolholder. The pointed "feeler" tip of the shorter section (leg) of the lever is engaged in a punch mark on the work to be centered. (Usually the work is first roughly "centered" by observation.) End of the longer lever leg (pointer) usually is aligned with the tailstock center though



BALL-AND-SOCKET-TYPE INDICATOR doing same job as pivoted-ring axis finder (shown centering punch mark on facing page). Tool bit is clamped beneath

another reference mark might be used.

Now, if the lathe spindle is rotated slowly by hand, the feeler point engaging the punch mark will describe a small circle—unless the work happens to be perfectly centered at the start. Because of the magnification of motion by the lever, the pointer will describe a much larger circle around the tailstock center. It is easy to see the extent of this circle.

The amount of motion magnification depends on the position of the fulcrum in relation to the lever ends (see drawing, page 128), and you can vary this simply by using longer or shorter leg sections. The work is centered by shifting it on the faceplate, or adjusting the chuck jaws, until the pointer remains virtually motionless as the spindle is turned.

The pivoted-ring indicator shown has a short-leg length of $1\frac{1}{2}$ in. and long-leg length of 10 in. Therefore its "magnification" is approximately 6.66X. The ball-



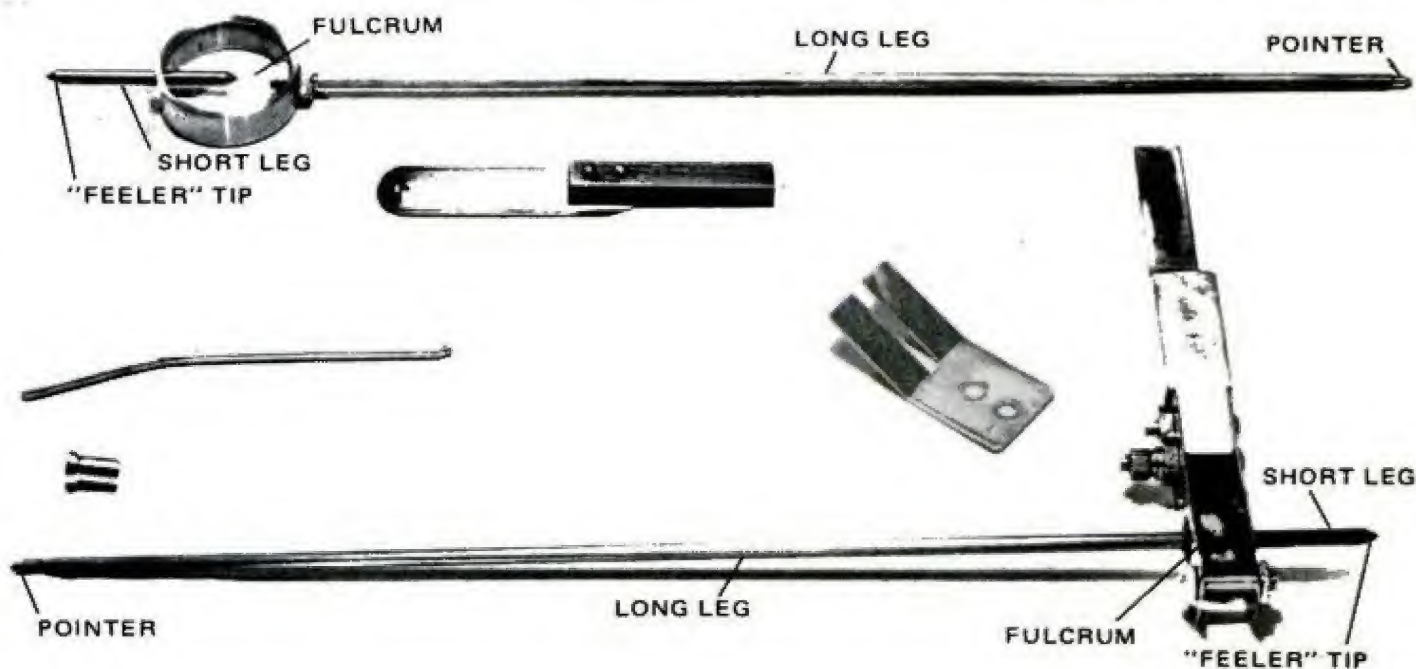
CLOSE-UP VIEW of ball-and-socket arrangement shows simplicity of design and construction. All of the variations explained in text can be made in shop



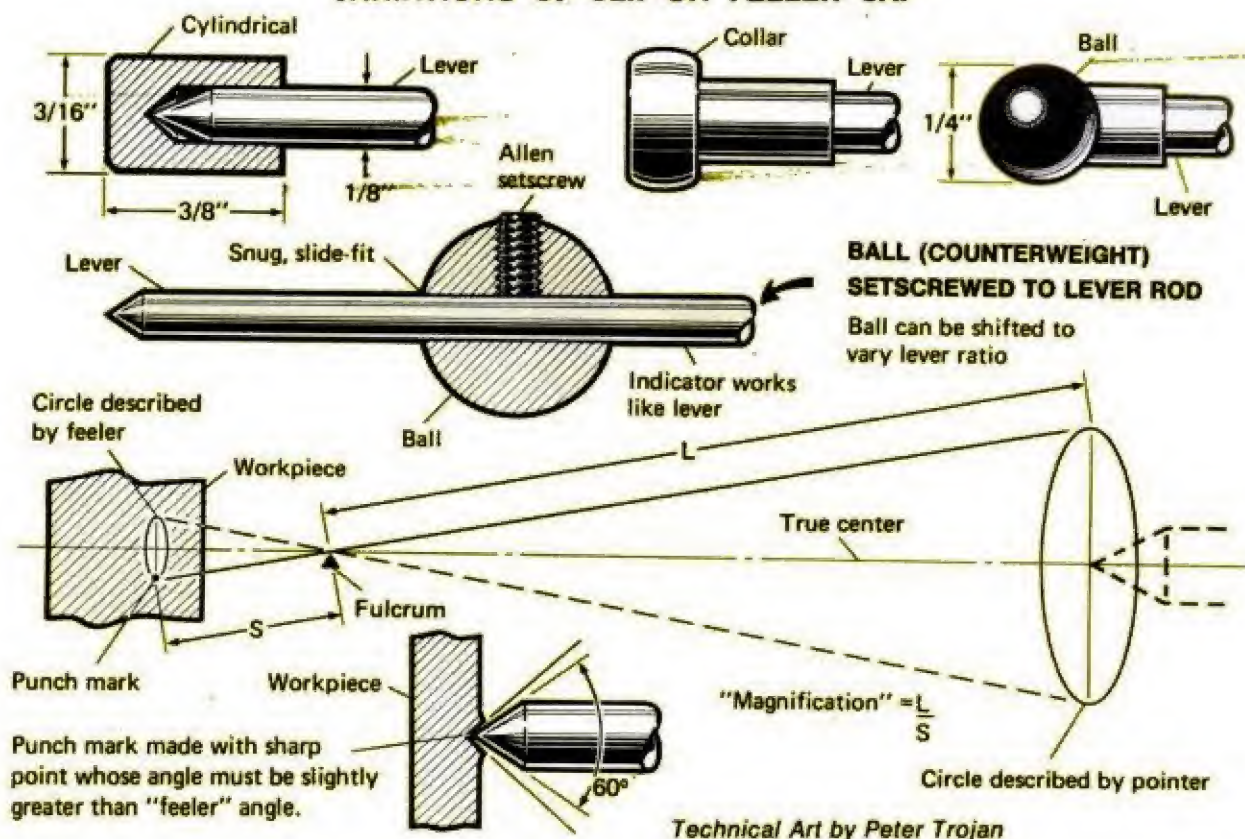
THIS SETUP MAKES IT A SNAP to drill a $\frac{1}{8}$ -in. hole through a chuck-mounted, $\frac{1}{2}$ -in. bearing ball

and-socket indicator has a short-leg length of $1\frac{1}{2}$ in. and long-leg length of 9 in., giving it a magnification of about 7.20X. Sensitivity can be upped by adding to the difference between leg lengths—usually by lengthening the longer one.

TWO TYPES OF CENTER FINDERS: ball and socket in foreground and pivoted-ring at rear. Brass cap (extreme left) is designed for use over the feeler tip. Slotted clip (center right) limits the movement to one plane



VARIATIONS OF SLIP-ON FEELER CAP



TYPES OF FEELER CAPS that you can machine are practically unlimited; experimenting is actually fun

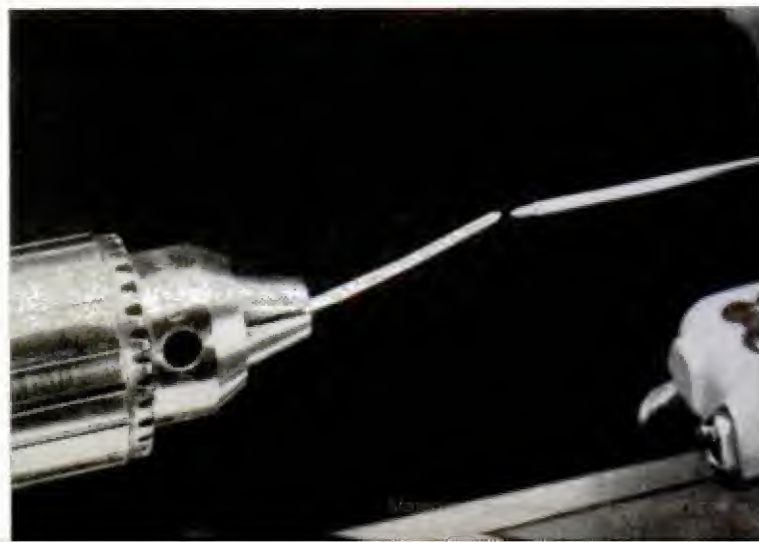
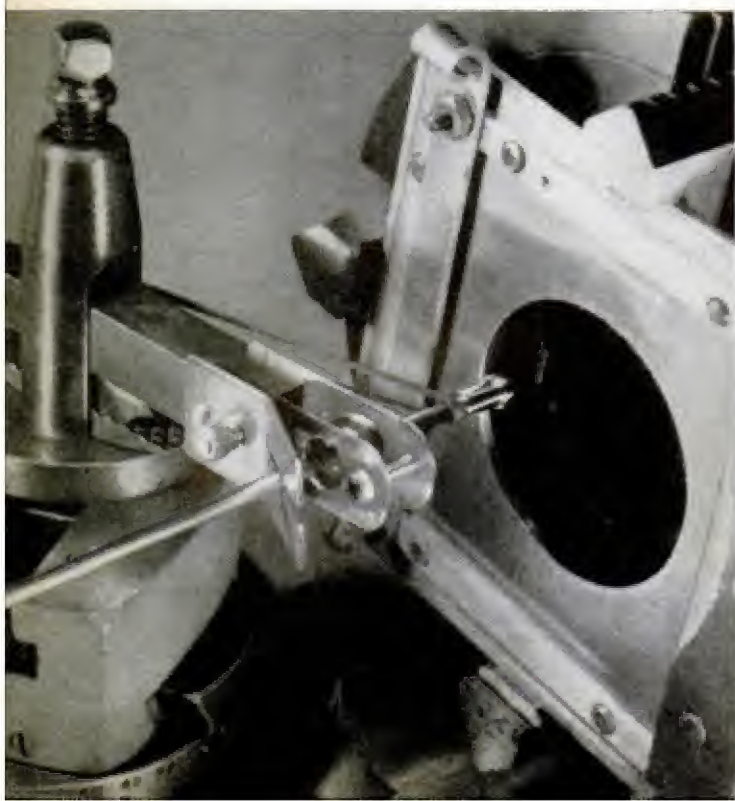
Recommendations for using such center indicators call for aligning the pointer with the tailstock center, so it will be relatively easy to judge the amount of pointer movement. This may involve careful adjusting of the position of the instrument on the carriage. A center finder usually seems to work well enough even if somewhat off the lathe axis; when applying the feeler to an offcenter surface,

as when centering a fairly large hole, the indicator may be considerably offcenter. A way to provide a reference point for such offcenter positions is to clamp, in a tailstock chuck, a piece of soft aluminum wire, or even wire solder, pointed at the outer end. This wire can be bent easily to position its point in alignment with the indicator pointer.

Parts needed for the pivoted-ring axis

BALL-AND-SOCKET FINDER (left) is rigged to serve as an indicator for centering work with respect to a circular opening. Slotted clip attached to tool-post permits the lever to move in one plane only

POINTED, SOFT-ALUMINUM WIRE in tailstock acts as an adjustable reference mark for aligning an off-axis indicator or for centering a punch mark



finder are shown below. It is supported by a strip of springy metal (D) clamped in the toolpost or toolholder as shown. An indentation made with a center punch or drill near the free end of the spring-strip engages the inner, pointed end of lever leg (A), while spring pressure holds the other end of this leg in the punch mark on the workpiece. Spring position is adjusted until the instrument is aligned with the lathe axis. This can be done beforehand by aligning it with headstock and tailstock centers.

Some construction details (letters refer to those in the photo below):

● **Short lever leg (A):** Chuck $\frac{1}{8}$ -in. drill rod and point ends to 60° by filing or turning. For greater wear resistance, harden and temper points. Or make from cold-rolled steel and case-harden ends.

● **Ring (B):** Brass was used for model, but it could be steel or stainless alloy. Drill $\frac{1}{8}$ -in. holes diametrically opposite one another for parts A and C. Part A may be a drive-fit, but soldering is possi-

bly more secure. Inner tip of A is at approximate center of ring.

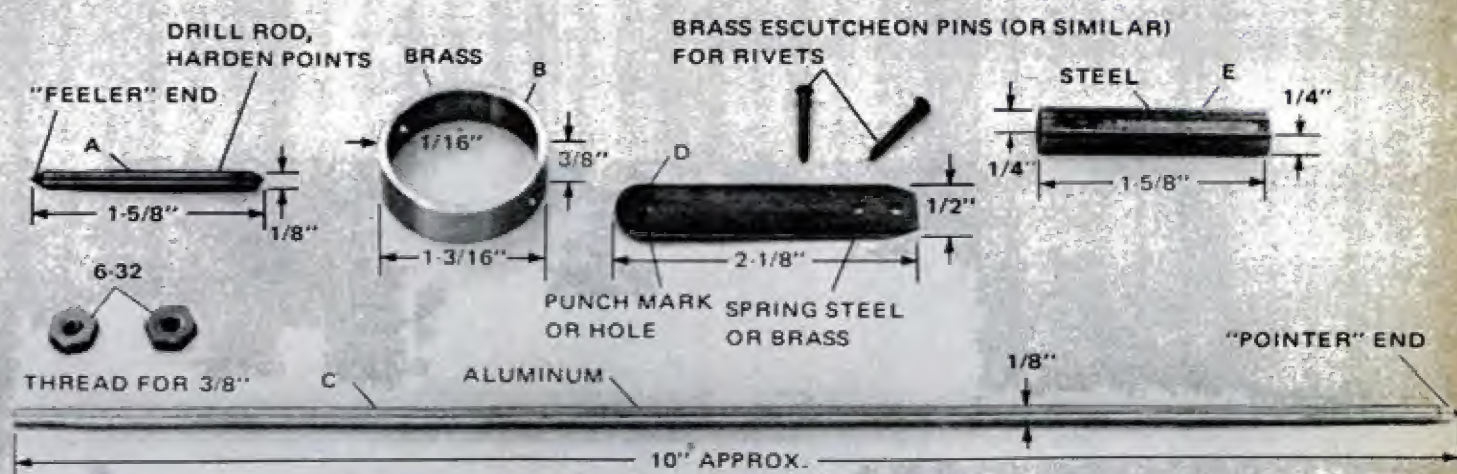
● **Long lever leg (C):** That shown was made from $\frac{1}{8}$ -in. aluminum wire for lightness. (It could be of some other material, even wood or bicycle spokes. File or turn one end to a point and thread the other end for 6-32 nuts which will lock it in the other $\frac{1}{8}$ -in. hole in the ring.

● **Flat spring (D):** A piece of steel crate strapping was used here—it happened to have about the right springiness. Any similar springy material could be tried. Make a fairly deep punch mark, or drill a small hole, for engaging point of part A. Near other end of D, drill two holes for rivets which can be brass escutcheon pins or common steel nails.

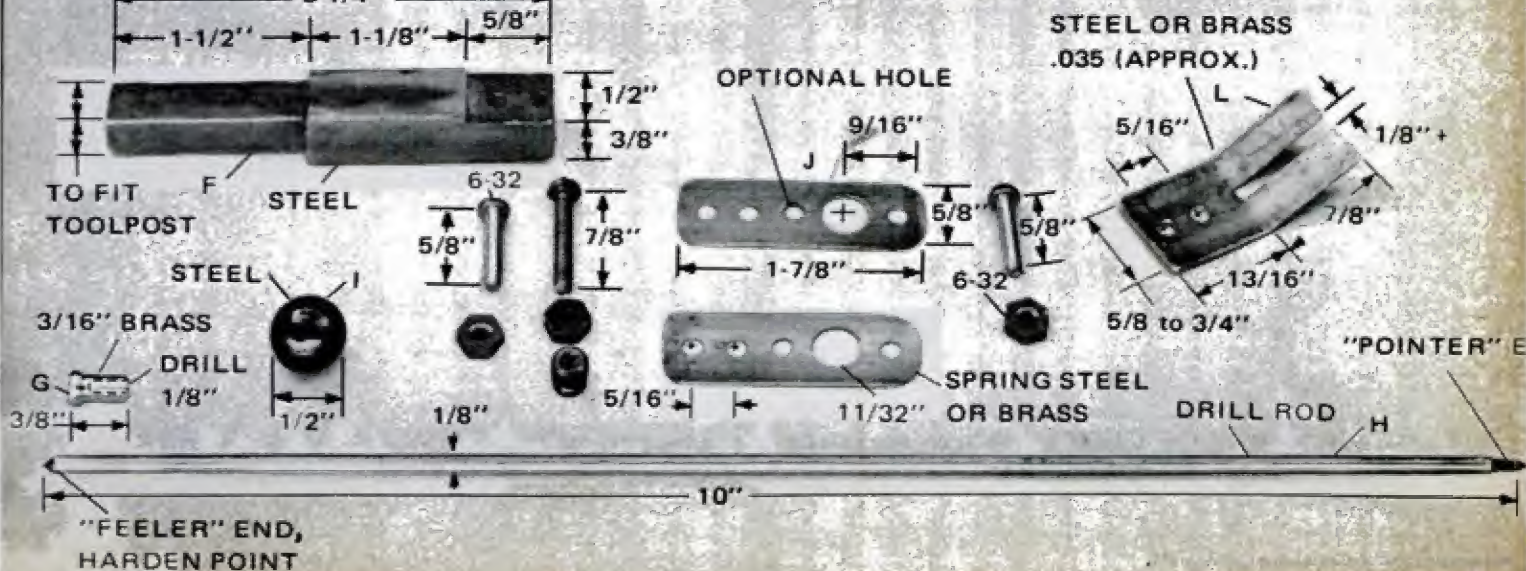
● **Spring-support block (E):** This is made to fit the lathe toolpost slot, the bit recess in a toolholder or some other carriage mount. Rivet holes to match those in spring D are drilled near one end, and D and E are securely riveted to-

(Please turn to page 174)

PIVOTED-RING AXIS FINDER

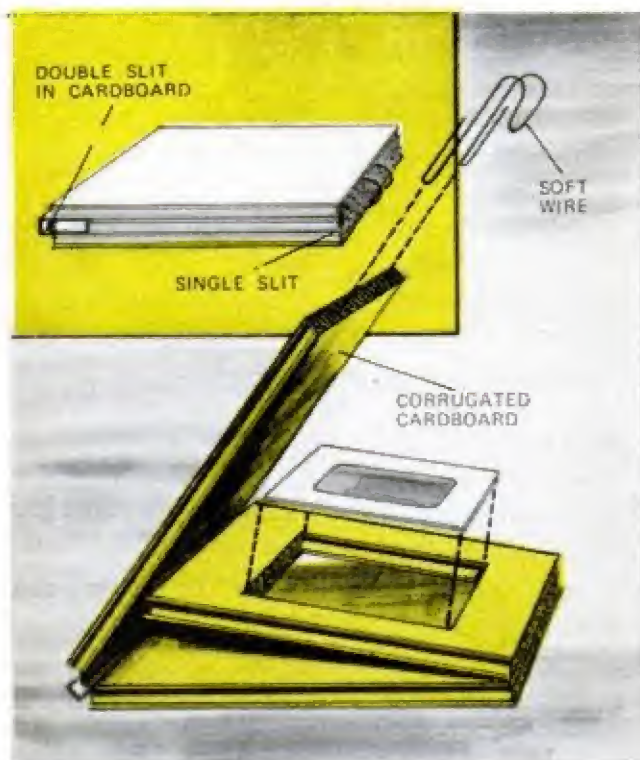


BALL AND SOCKET AXIS FINDER AND OFF-AXIS INDICATOR





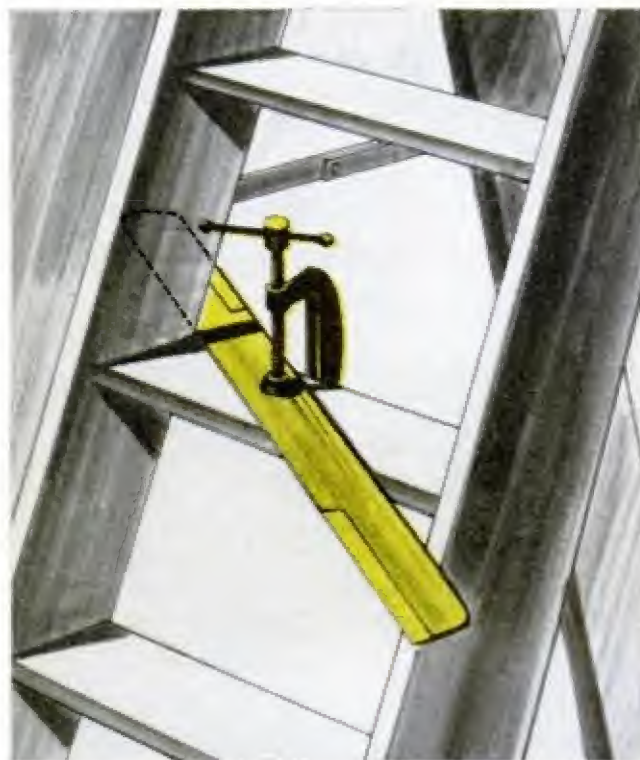
SOLVING



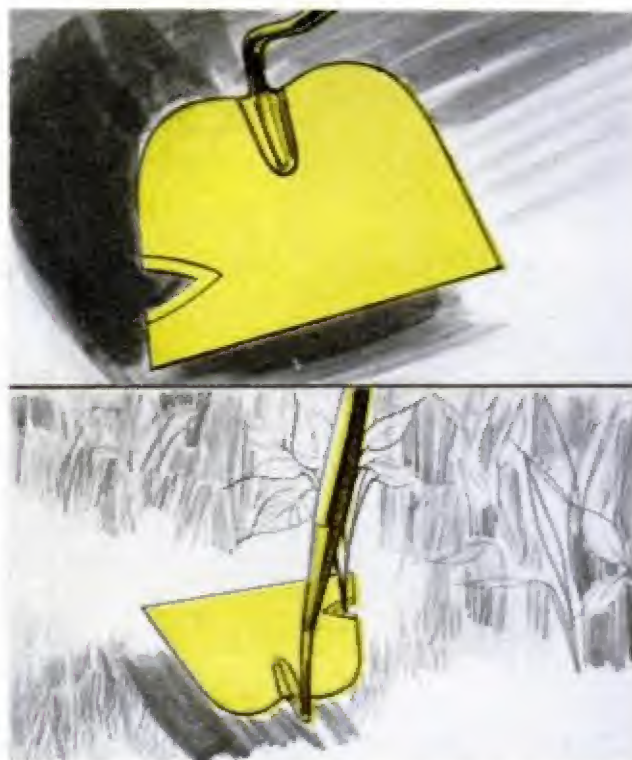
ONE OR TWO TRANSPARENCIES in an envelope stand a good chance of being crushed in the mail. Next time, fashion a mailer cut from a strip of corrugated cardboard as shown.—*E. V. Reyner, Salinas, Calif.*



SELF-HOOKING DOOR CHECK can be improvised from a pair of shade-roller brackets. Attach one to the door and the other to the base to engage it when the door is swung open.—*William Swallow, Brooklyn, N.Y.*



A GOOD WAY to hold rotary mower blade for sharpening is to clamp it to the step of stepladder in the manner shown. The blade can't move, and both your hands are free for filing.—*Lee Adams, Owensboro, Ky.*



GARDEN HOE will do a much better job of chopping off a stray weed here and there in your garden or flower bed after you have filed a sharp V-notch on one side near the blade edge.—*Albert Pippi, Baltimore*

POPULAR MECHANICS

HOME PROBLEMS

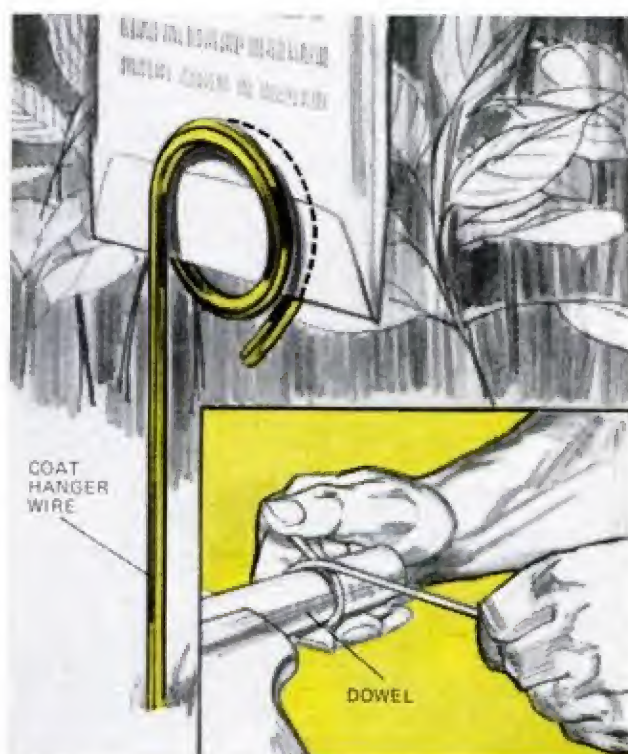
Illustrations by Adolph Brotman, Worman Associates



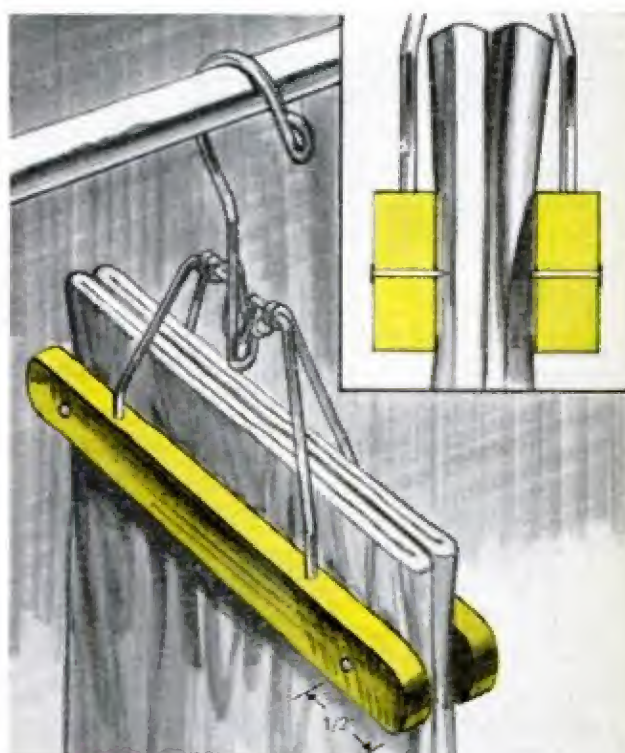
HOLLOW RUNGS on your aluminum ladder can hold paint cans if you insert a snug-fitting length of rod or dowel. This setup is also sturdy enough to support a small tool bucket.—*John Krill, North Lima, Ohio*



TANGLEFREE BALL OF TWINE is insured if it's placed in a small watering can with the leader fed out of the spout. Ball will stay neat even as its size dwindles after much use.—*Marshall Lincoln, Wickenburg, Ariz.*



SEED-PACKET STAKES can be made from light-gauge coathanger wire. Just make a couple of turns around a broomstick, cut wire to length and insert packet between the coils.—*Bob Brightman, Great Neck, N.Y.*

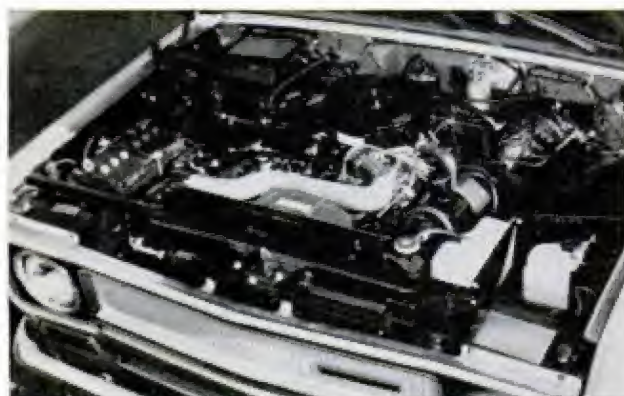
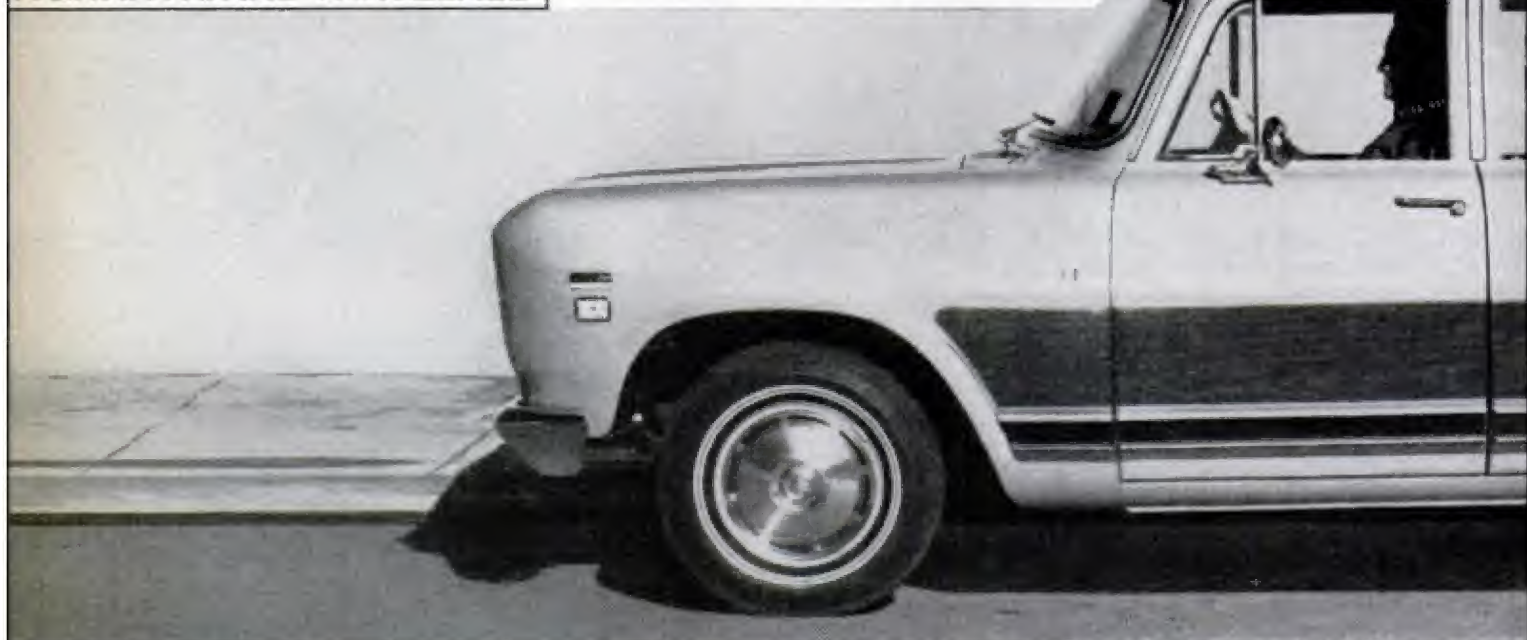


TROUSER HANGERS, intended for pants with cuffs, often fail to hold cuffless ones. But if you add two tacks per arm with points projecting about 3/16 in., the problem is licked.—*G. L. Ransom, Carleton Place, Ont.*

She's No Beauty, But Owners

PM OWNERS REPORT INTERNATIONAL TRAVELALL

A Nationwide Survey Based on
1,115,000 Owner-Driven Miles



THE TRAVELALL commands greater owner loyalty than any U.S. car reported lately. When we asked, "Would you buy another Travelall?" 92.4 percent answered yes. The only car that's topped that figure within recent memory was the Mercedes-Benz at 97 percent (page 100, Jan. 1971 PM).

What makes Travelall owners so fired up about their wagons? We got the answer indirectly. It was interesting that Travelall owners give mostly rational, sane, solid reasons for buying and appreciating their choices—a refreshing change from so many emotional statements made about other cars.

We noted that Travelall owners had shopped hard before buying. "Studied all

NEARLY HALF OF OWNERS selected 345-cu.-in. V8 plus most of power options. Two other V8s and a Six are also available with a range of 145 to 253 hp

competitive makes in 1964," wrote a North Carolina retiree. "This is my second Travelall—got 140,000 miles out of the first." The Travelall's field has become crowded of late, with healthy competition coming from Chevy and GMC (Blazer, Suburban, Carryall), Dodge Power Wagons, and also from station buses, regular big wagons, plus Jeep and Checker wagons.

Why buy Travelall? A Minnesota minister: "Its extra size, sturdiness and spa-



TWO-WAY TAILGATE is a change owners would like; 76 percent of them ordered an electric rear window

POPULAR MECHANICS

Say, 'Look Beneath the Skin!'



By MICHAEL LAMM, West Coast Auto Editor

Photos by the Author

TRAVELALL shown here has every available exterior trim option: wood-grain side panels, bright-finish grille and various trim strips, black vinyl top, chrome bumpers, stainless-steel wheel covers and white walls

cious interior. We like to camp, so here is a more adaptable towing vehicle. I haul a lot of people in church activities—the nine-passenger Travelall is still roomy.”

A third of all owners use their wagons for recreation and business. “Will take large loads. I haul airconditioners and big fans, but there’s also room for my family of seven,” writes a Louisiana salesman. Many farmers, ranchers, contractors and small businessmen use their Travelall in dual capacities.

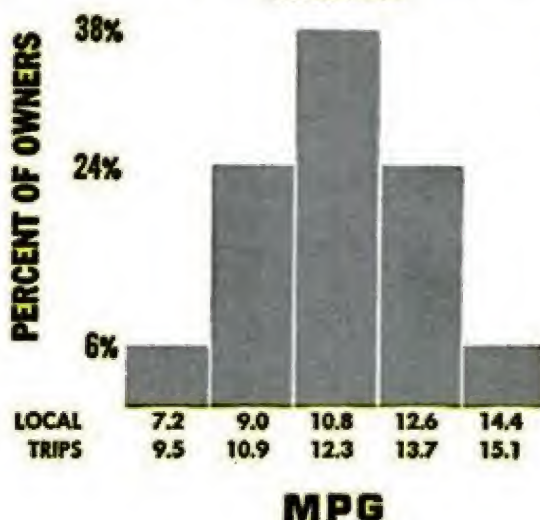
Recreational-use potential of the Travelall seems bounded only by their owners’



BETTER SERVICE from I-H than Big Three dealers is belief of many owners: “They’ve more time to care”
MAY 1971

TRAVELALL FUEL MILEAGE CHART

345-cu.-in. V8



imaginations. Their wagons are used for recreation of all sorts—43.3 percent in camping, 41.0 percent for vacationing, 28.1 percent to hunt.

A Michigan veterinarian’s wife claims one of the most unusual sports: “We go ‘car hooding.’ That’s where we take the hood off an old car, tie a 40-foot rope to it, hook onto the back of the Travelall, and tow the kids (aged 3-11) across the snow on our farm. Great fun!”

But towing trailers seems a more common calling. “Our experience pulling a travel trailer with automobiles has not been favorable,” says an Ohio adjuster. A Utah florist: “I am a florist and also have a 17½-foot camper trailer. I feel the Travel-



MINI CENTER SEAT does triple duty as storage bin, armrest or as a passenger seat for short distances



REAR BENCH has plenty of legroom, easy access via large doors; and the ashtray is handy for all riders

all is best for both business and pleasure." Several owners mentioned really loading up their vehicles—motorcycles on the front, boat on the roof, trailer out behind, family and pets inside. A Nebraska purchasing agent: "I'm a scoutmaster. We put four canoes on top and pull another eight on a trailer. Not many cars can do that."

Under "Specific Likes," owners place handling first. Handling and ride impressed them because the Travelall behaves like a much smaller passenger car. "Built like a truck, handles like a car"—Wisconsin excavator. "Rides like a dream"—California retiree, and he has plenty of echoes. "Really surprised me how easy it is to handle," says a Buffalo maintenance manager. "It doesn't act its size, and it's so much easier to park because I look down at all the other cars."

This mention of height cropped up again and again. "A lot of see-ability," one Las Vegas put it. "Can see three or four cars ahead on the street in tight traffic." Or a Pennsylvania computer programmer: "You step up and slide in rather than thread yourself earthward." Several owners mentioned that they liked their Travelalls for sightseeing and photographing. "Tall seating gives more legroom, and third bench stands a little higher than the rest, so even kids can see ahead from back there"—Illinois electrician.

What *don't* Travelall owners like about their vehicles? Not enough gas mileage, said 26.4 per cent (see chart). A number complained of repairs having to be made to the speedometer cable and the electric rear-window motor. Many mentioned the engines were cold-natured and that it



SPARE TIRE rests in compartment at right of cargo area. Both rear benches fold for a huge payload bay



HIGH SEATS, BIG GLASS give great view. Travelall rides like a car, is amazingly quiet, smooth, gentle

POPULAR MECHANICS

took too long for the heater to warm up. Some wanted an additional heater core and blower for the rear-seat area. There were gripes about rattles (14.3 percent), specifically that the second seat's upright latch can't be hooked down tight enough to eliminate that rattle. But generally, owners marveled at how quiet and sedan-like their Travelalls are.

About quality and workmanship: "Doors, panels, etc., could be fitted better. Snow still blows in as it always has through the tailgate window." Or, "Workmanship should be better at this price." Also, "I find the workmanship and quality good; better than most other makes." But, too, "Poor—doors don't fit tight, trim peels off, upholstery too thin, windshield leaks, and keys and locks look like they're made for a kiddie car." "On essentials, workmanship is very good. It's mechanically sound, body strong, but finish is of poor quality."

Broadly speaking, International customers seem to feel they're getting a better shake from dealers than they ever got elsewhere. Some comments: "Dealers are



HANDLING IS PRAISED; most owners agree it's nimble beyond expectations for a car of I-H's dimensions

still small enough to take time and give you individual attention. No big run-arounds." "I have never been treated better." "When I first bought the Travelall, a lot of little things were wrong. The fine attitude of the dealer kept me from getting really upset. They did all they could to make it right." "The consideration

(Please turn to page 189)

Summary of 1971 International Travelall Owners Reports*

Total miles driven1,115,438

Average miles per gallon:

304-cu.-in. V8, local driving...11.5
long trips...13.5
345-cu.-in. V8, local driving...10.8
long trips...12.3
392-cu.-in. V8, local driving...9.7
long trips...11.5

Engines:

232-cu.-in. 62.6%
304-cu.-in. V822.2
345-cu.-in. V847.6
392-cu.-in. V827.5

Transmissions:

Automatic62.4%
3-speed manual10.8
4-speed manual19.9
5-speed manual7.0

Models:

1000D/1010D67.6%
1100D/1110D14.9
1200D/1210D0.5
1110D 4x411.7
1210D 4x45.3

Why the Travelall?

Towing ability47.9%
4-wheel drive12.0
Recreation9.9
Like the size9.4
Interior roominess9.4

The Travelall for business:

For small retail business...34.9%
Construction and allied...13.6
Agriculture10.6
Professional9.1
Not used in business...21.2

The Travelall for recreation:

For camping43.3%
During vacations41.0
For hunting28.1

What do you tow?

House trailer29.3%
Camp trailer29.3
Boat10.8
Rental trailers7.2
Skimobile3.0
Livestock trailer3.0
Does not tow17.4

Specific likes:

Handling31.6%
Roominess28.3
Comfort26.7
Visibility26.7
Power16.0
Ride12.8
Performance11.8
Styling11.2
Roadability9.6

Specific dislikes:

Economy/gas mileage...26.4%
Rattles14.3
Workmanship11.0
Poor heater7.1
Seat style6.6
Dealer service6.0

What changes would you like?

Seat styling21.3%
Better workmanship8.7
Fewer rattles8.7
Better styling8.7
Two-way tailgate7.3
Better gas mileage7.3
Better heater6.0

Had any mechanical troubles?

Yes53.6%
No46.4

What kind of trouble?

Electrical29.8%
Carburetor13.5
Transmission13.5
Brakes10.6
Speedometer cable8.7
Gas line7.7
Oil leak6.7

Did you repair it yourself?

No92.2%
Yes7.8

Other cars owned:

Ford12.8%
Chevrolet12.0
Volkswagen10.6
Pontiac10.6
Buick9.9
Dodge7.8

Accessories/power options:

Power rear glass75.7%
Power steering, brakes...75.1
Airconditioning71.4
Automatic transmission...62.4
Limited-slip axle48.7
Radio34.3
Custom trim34.3
Bucket seats18.1
Tinted glass15.7
Extra gas tank12.1

Age distribution of owners:

15-29 years5.7%
30-49 years54.4
50-plus39.8

Would you buy another Travelall?

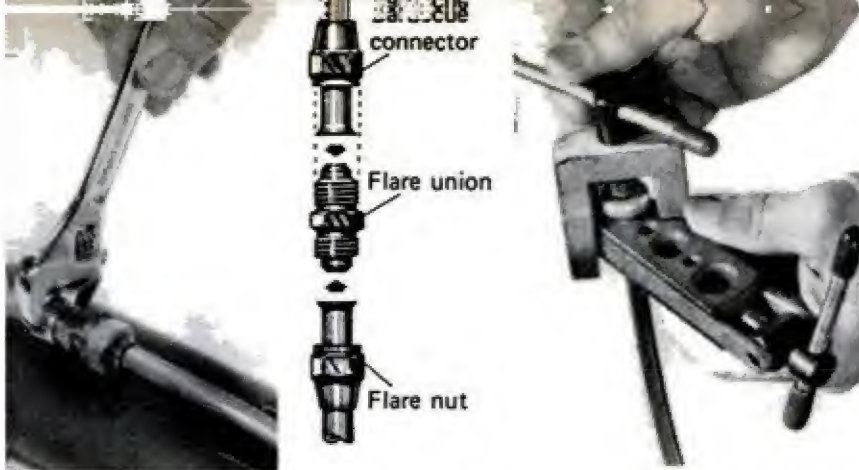
Yes92.4%
No7.6

*Percentages might not equal 100% due to rounding and/or insufficient data.

HOME AND YARD

Light It – and Your Barbecue's Ready





FLARE-UNION FITTING is used to connect supply line after end of the $\frac{3}{8}$ -in. copper tubing is flared with a flaring tool



AFTER CONNECTING supply line, center post in 2-ft.-deep hole, brace it plumb

With a gas barbecue you can say good-bye to hard-starting, charcoal and messy ashes.

By **WAYNE C. LECKEY**, Home and Shop Editor

Photos by Robert D. Borst

IF THE CHORE of starting and cleaning up the mess of a charcoal barbecue is getting you down, let me tell you what a pleasure it is to play head chef with a gas-fired outdoor barbecue.

Nothing could be easier to start. You merely open the cover, light a match, insert it in the ignition hole and turn the temperature control knob to "high." The burner ignites instantly and in a few minutes your barbecue is ready.

When you're through, you close the cover and let the flame burn for 20 minutes. The intense heat burns off the grease and food particles from the grates and the ceramic briquets and your barbecue is clean for next time.

Contrary to popular belief, you don't need charcoal to add charcoal flavor. The outdoor barbecue flavor you get is a result of charring and searing. The flavor and aroma actually come from the smoke of natural juices dripping on the hot ceramic (glass rock) briquets.

I had to see for myself and I can truthfully say that barbecuing with gas is having a cookout the "in" way—with the dependability of a kitchen range. I found that even the more economical cuts of meat can be transformed into mouth-watering delicacies—and fast. A one-inch steak can be grilled, well done, both sides, in about 11 minutes.

The gas-fired barbecue you see here is the Master Chef, manufactured by Charmglow Products, Inc., Antioch, Ill. 60002. It's a heavy cast-



HOLE IS FILLED with concrete to 1 in. below the gas-line connection, then with dirt



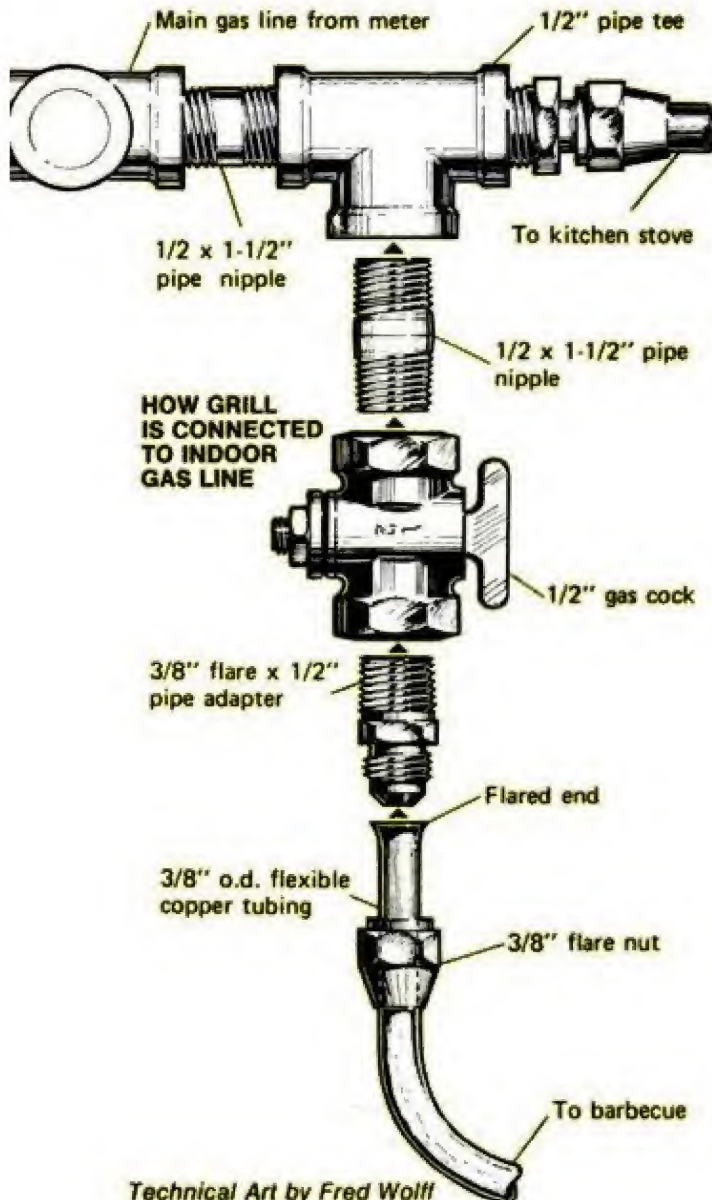
ALUMINUM PIT is placed over post, locked by wingnut. See that front faces in the same direction as valve knob



BURNER IS PLACED in bottom of pit and air mixer lowered into hole until it fits over the orifice cap



TO TURN ON GAS, valve is pressed inward, turned counterclockwise. Never light gas with cover closed



aluminum affair, which means it won't rust, and it can be mounted either on a fixed post or a pedestal base. It has a king-size, stainless-steel grill (375 sq. in. of cooking surface) and comes with an all-purpose rack for additional cooking and warming. A full line of accessories includes a battery-operated rotisserie, a rotisserie basket, a weiner wheel, plus a handy "up front" shelf. You have to provide the 3/8-in. copper tubing for the gas line to the house and the necessary fittings. The series of pictures on these pages show how I installed it.

How you tie-in to your existing household gas line will vary with each installation. I brought the tubing into the basement through a hole in the block wall and connected it at a point where a line branched off to the kitchen stove. This required shutting off the gas at the meter, backing out the stove-line connection, installing a 1/2-in. pipe-tee fitting as shown in the drawing at the left and reconnecting the stove line. A gas cock lets me shut off the gas to the barbecue during the winter. Your local gas company will make the actual connection if you prefer. If you do the job yourself, use pipe-joint compound on the fittings.

A word about using your gas-fired barbecue:

- Be sure the glass briquets are distributed evenly, one layer thick, over the entire surface of your grate. Under nor-

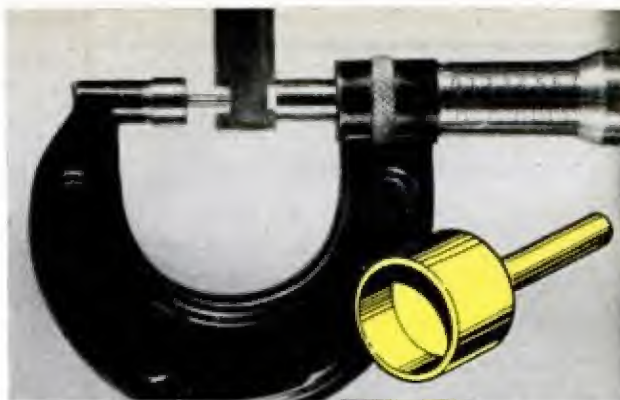
(Please turn to page 176)

HINTS FROM READERS

Gadget for measuring grooves

Usually, when you want to mike grooves and holes which are smaller than the micrometer's anvil, you can't. But if you make the "gadget" shown in the drawing at right, you can. Make the cup so it's a slip-fit on the anvil; the stem can be any suitable diameter and length.

—Harold Neibert, Davenport, Iowa



Hacksaw blade makes cutoff tool

A short length of worn-out hacksaw blade makes a fine lathe bit for cutting very narrow grooves and an excellent cutoff tool. Simply grind the blade to fit the holder (usually with toothed edge up) and form a rake at cutting tip. No side clearance may be required, but if so, the blade can be ground to produce a tolerance.—Walter E. Burton, Akron, Ohio



Porcelain-mending trick

If you've ever tried to reassemble a broken piece of valued glassware, keeping track of the order in which the pieces must go together can be a puzzler. Next time, assemble the parts without glue first and tab them with small pieces of masking tape. Then number each part in its logical gluing sequence and start cementing.

—B. W. May, Oak Park, Ill.



Trick for making thin washers

When reducing a shaft to a smaller diameter, the tool can be manipulated to produce—as a by-product—some very thin washers. First turn a small tenon as shown in the detail, then shift the tool and advance it to cut a thin-wall disc. When the previously turned diameter is reached, move the carriage so the "washer" flexes under the thrust and snaps free.

—B. W. Ervin, Kent, Ohio



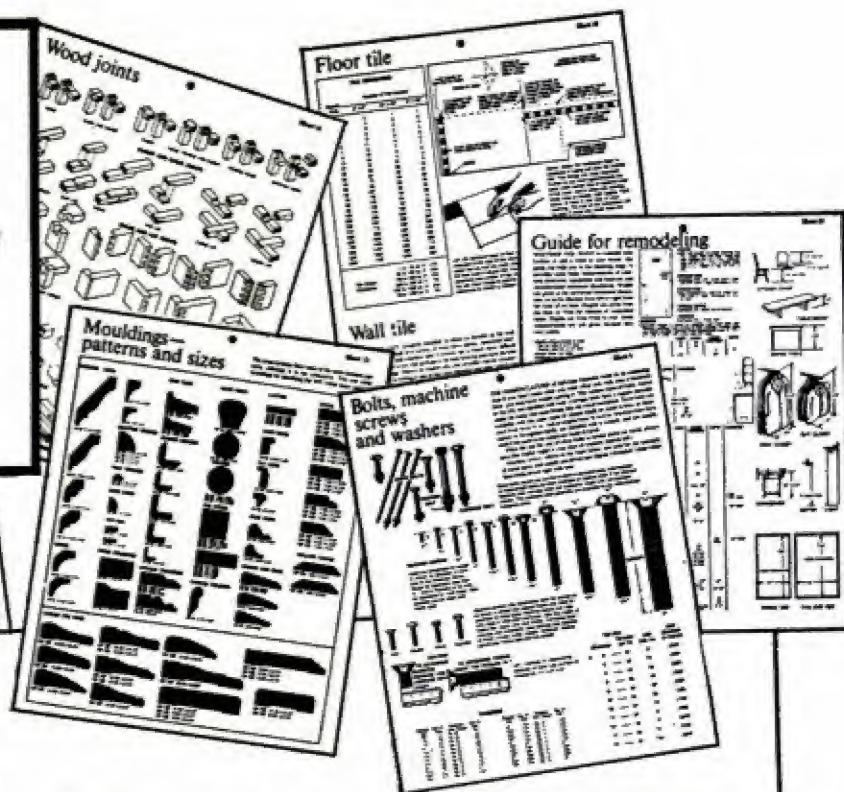
Fishhook safety

Whenever you travel with uncased, strung-up fishing rods, you run the risk not only of tangled hooks and rod tips, but also of accidentally hooking yourself or your fishing partner. To avoid both, I simply wrap the lures in a "cocoon" of aluminum foil. If placed and removed carefully, the foil can be used a number of times.—James Tallon, Phoenix, Ariz.



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POPULAR MECHANICS

How to Tow a Trailer

By A. R. ROALMAN



Drivers towing trailers are four times as unsafe as those in cars alone. Here's how to avoid making yourself an accident statistic

CARS PULLING TRAILERS were involved in four times as many highway accidents as the same number of cars without trailers," said the man sitting across a cluttered desk from me.

No ordinary sort, the man is one of the most knowledgeable traffic authorities in the country. He is J. Stannard Baker, director of research for the highly regarded Traffic Institute of Northwestern University. When he says something about traffic safety, you can count on it being hard-nosed fact based on on-the-roadway sniffing and hunting he has done. He had just completed his share of a massive survey for the federal government, which, with the cooperation of the police of seven

states from Illinois to California, had studied highway accidents on U. S. 66. Called "Single Vehicle Accidents on Route 66," Baker's report of this study at the annual meeting of the Highway Research Board told about the factors contributing to all single-vehicle accidents studied while the project was underway. In this report, which was not for publication, is a reference that anyone who pulls something—another car, boat, house trailer, camper, a rental trailer (every driver is likely to pull one of these units at some time during the next few years, considering the way trailer rental stations are mushrooming) or even a horse trailer—behind his car should know about. This small statistical tabulation entitled *Risk*

"People pulling trailers stop at a service station . . . find they have 25 or 26 pounds pressure in their car tires and maybe as much in the trailer tires . . . and take off. Their chances of a trailer-tire blowout went up like a skyrocket . . . air pressure should be about 50 pounds."



50 lbs

25 lbs

25 lbs

Index By Type of Vehicle, also stated:

"If you are driving a standard-sized car, your 'risk index' is 4.57 if you have a trailer and 1.00 if you aren't pulling a trailer; if you have a compact car, your RI is 8.48 when you have a trailer behind and 2.23 when you don't; if you have a small car, the numbers are 14.47 with a trailer, 3.49 without.

In all cases, when you put a trailer behind your car the odds of your having an accident of some sort quadruple.

Why? The odds were a little too much to allow to go unexplored. What steps can you take to reduce the odds against you? If you expect, during the next few years, to hook anything behind your car, what can you do to wipe out some of the specific dangers of trailer pulling?

As a veteran boat puller with a lot of hours chalked up to pulling mobile homes and rental units, I had had my share of close calls and hard-knock education, but I wanted to know what Baker, state police and manufacturers of trailer equipment, automobiles and trucks had to say.

Let's assume that you're clean on two major causes of all accidents: Driving while sleepy and driving right after having a few drinks. These are cited most often as the major causes of single-car wrecks: going off the road, plowing into a big, immovable tree or a rock-hard concrete abutment, or flipping over. Let's assume that, when you hook up your trailer, you are sober and rested, and you're not going to push yourself so hard that you are likely to fall asleep at the wheel. What else can you do to reduce the possibility of having a trailer accident?

"Either have brakes or remember that you don't have brakes," said Baker, who pointed out that a lot of people who hook on a trailer forget they no longer have a normal braking situation. In all likelihood, the trailer—if it's small—will not have separate brakes. That, in itself, is dangerous. Here's why:

You're buzzing down a country road at 60 mph, come into a curve and suddenly see a cow 100 feet ahead. If you're like most drivers, you'll ram your foot down hard on the brake pedal. Good show, except that those brakes are only going to stop your car.

How about that 400 or 500 pounds of iron behind you? No brakes? It will tend to keep coming. And if it's at a slight angle



"Coming to a blind curve or intersection? Tail off on your speed and enter the potential danger spot with every chance to stop your car and the load behind it without violent braking."

to your car, it easily could swing right on around, pull the rear end of your car with it just as sweetly as you please, and dump the whole shebang against the nearest tree or concrete rail. Unexpected little problems like that make the odds against an accident about four to one worse with a trailer than without it.

So, okay, what do you do? You're without trailer brakes and have to get from where you are to where you want to be.

"Most people with trailers drive like they don't have trailers," said Baker. "That's foolish. They should slow down about 10 percent from their normal speed and give themselves plenty of room to stop without hitting their brakes suddenly and hard." Coming to a blind curve or intersection? Tail off on your speed and enter the potential danger spot with every chance to stop your car and the load behind it without violent braking.

"Tires are another problem," said Baker. "People pulling trailers stop at a service station to check their tires. They find they have 25 or 26 pounds of pressure in their car tires and maybe as much in the trailer tires. They think everything is okay, get back in and take off."

Their chances of trailer-tire blowout went up like a skyrocket because the air pressure should be about 50 pounds. Boom along on a hot summer day with 25 or 26 pounds in your trailer tires, and you'll flex their side walls in the same way a piece of metal reacts when you bend it back and forth rapidly: Build up heat in it, cause it to grow weak, then break.

I drove the interstate highway system in Illinois, Wisconsin and Missouri to check on blown-out trailer tires. They were as common as dirty rags around a service station. On one particular hot day, while

Calling the new girl is working up your nerve, working out your line, then she says yes and everything's cool and you can relax and...

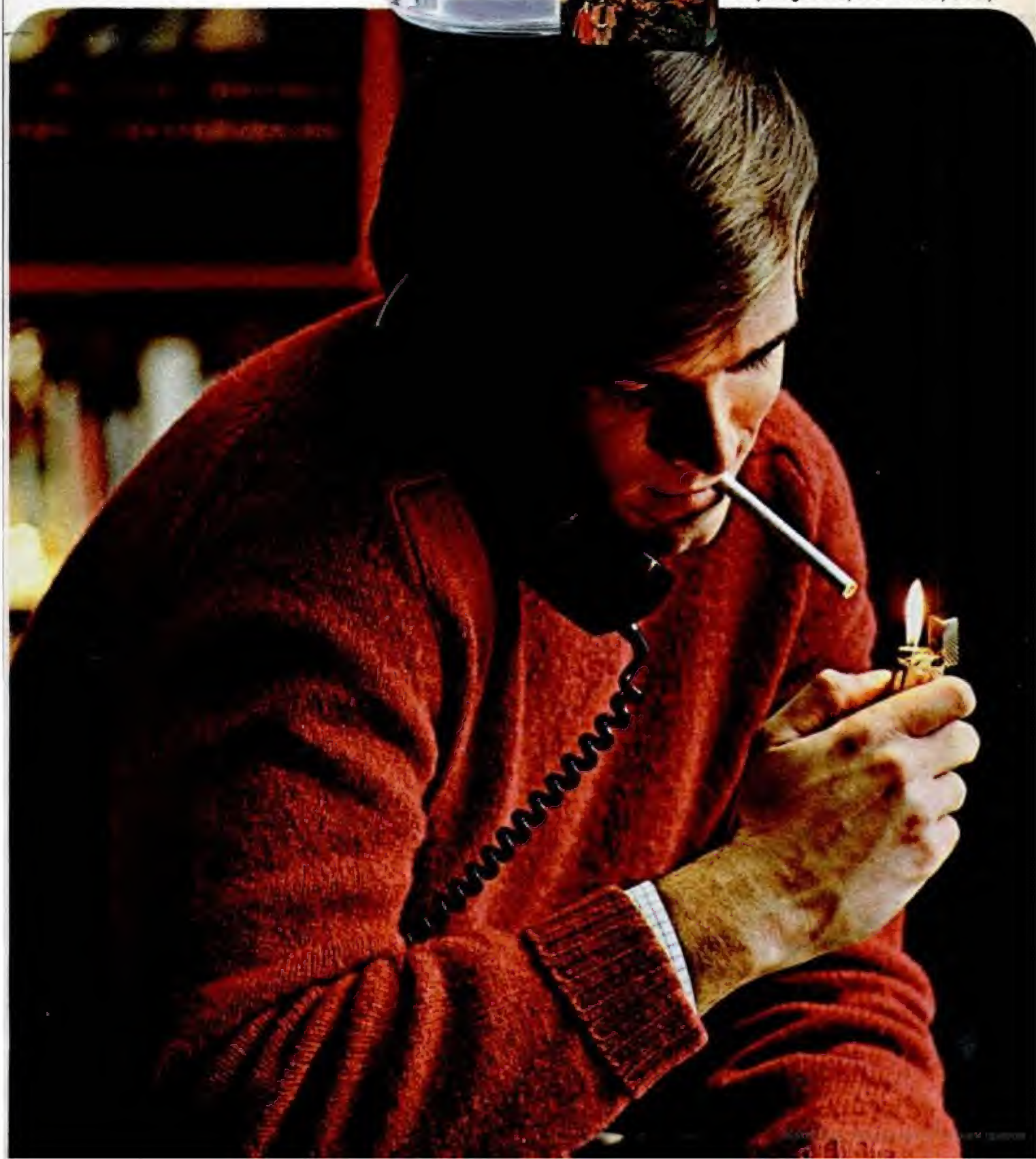
This...is the L&M moment.



The pressure's off. Break out an L&M. Light up and enjoy the rich, full flavor that makes L&M right for you. Right for now.

RICH, RICH L&M

19 mg. "tar", 1.3 mg. nicotine av. per cigarette by FTC method. (Jan. '71).





"... stick your hand against the trailer-wheel hub and feel how warm it is."

driving from Illinois (where a lot of city dwellers use their trailers only on weekends) to Wisconsin, I saw, at least once every

five miles, a crippled trailer with a blown tire.

How do you beat this problem? I talked with tire manufacturers, but they really don't have an answer. Here's a typical comment from the public relations representative of a major tiremaker: "The tire engineers tell me that small trailers involve so many different tires that it is difficult to select tables. In many of these utility tables, passenger tires are used and in that case the best we can do is to recommend the regular pressures under passenger car conditions." *In this case, they probably would all be overloaded.*

The Tire and Rim Assn., a trade group that should have the answer, if anybody should, has a "task force" working on this and is meeting with equipment manufacturers. Recommendations, according to a tire company spokesman, will be "several months in coming."

So what do you do? The best partial answer I have seen is a table published by the Rubber Manufacturers Assn., another trade group. Concerned only with boat trailers, this table advises that if your trailer tires are not listed on the table, do one of these things:

1. Ask the *manufacturer* of your trailer unit to give you, in writing, his inflation recommendations for your unit.

2. Don't drive at high speeds (above 45

mph) for long periods until you have a firm inflation recommendation from the trailer manufacturer.

3. Unless you are dead certain that you are running with properly inflated trailer tires, don't drive for more than an hour without going back to check them. If they feel hot, stop and let them cool off. Hot tires are getting ready to blow, and blown trailer tires cause problems.

Trailer wheels don't go sour only because of blown tires. Bearings are another problem. Usually, trailer wheels turn much faster than the wheels of your car; they're smaller but still cover the same distance as the car. If the bearings aren't well protected by grease, they get chewed up in no time and you lose a wheel or a trailer . . . or a car . . . or your life.

Every time you stop at a service station and check the pressure of your trailer tires, stick your hand against the trailer-wheel hub and feel how warm it is. If it's hot enough to make you jerk your hand back, don't waste time. Ask the attendant to pull that wheel and glob the bearing with grease, after checking to make sure that the bearing housing is still intact.

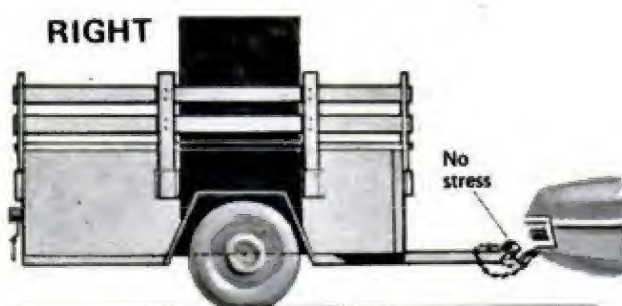
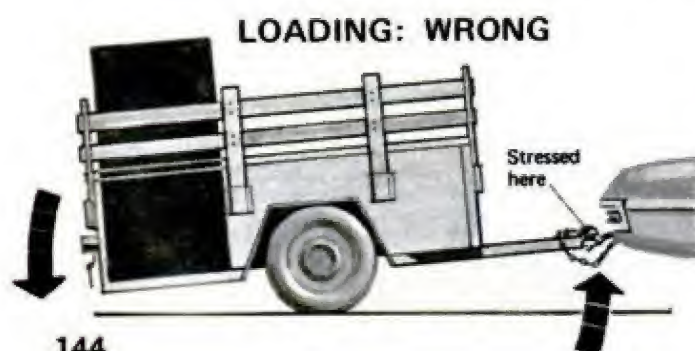
"Loading is another factor," said Baker. He showed me how some drivers will load the tail end of a trailer with heavy furniture, thus lifting the rear end of the car until it has little rear-wheel braking ability.

Distribute the load evenly, with the heaviest pieces as close as possible to the area over the axle. Place those pieces as low in the trailer as you can, so they won't swing or fall and cause the load to shift.

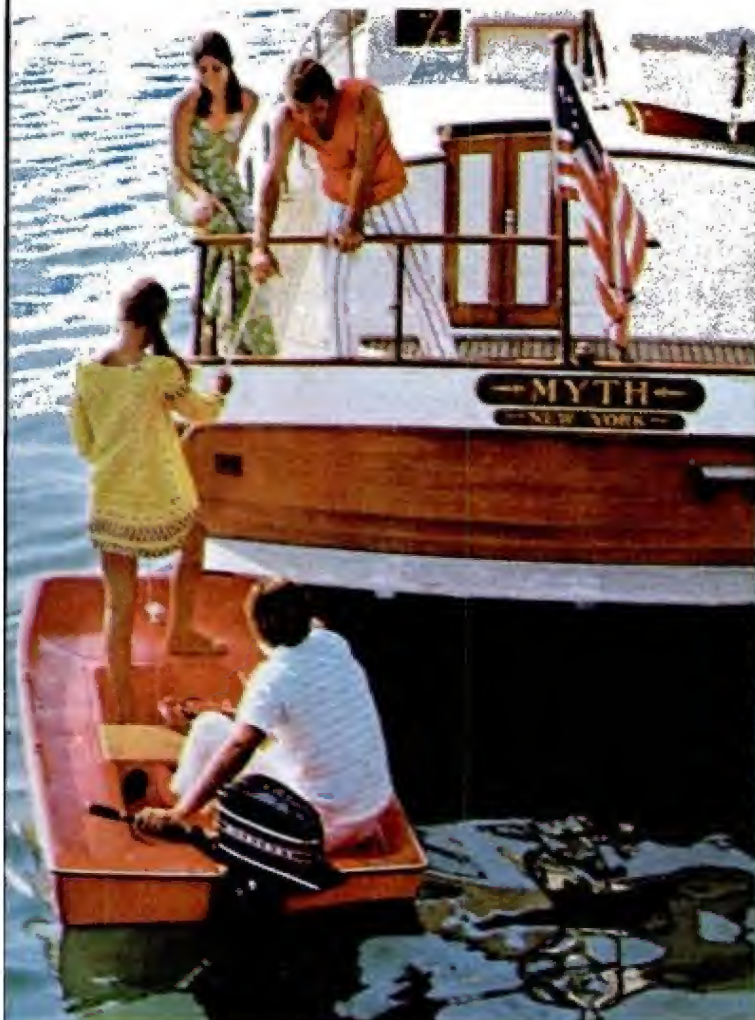
Proper loading doesn't solve everything. Winds, for example. Most trailer pullers aren't prepared for the effect of crosswinds, says Baker.

A high-sided rental unit, house trailer

"... some drivers will load the tail end of a trailer with heavy furniture, thus lifting the rear end of the car until it has little rear-wheel braking ability. Distribute the load evenly, with the heaviest pieces as close as possible to the area over the axle."



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Kiekhaefer Mercury/Division of Brunswick Corp./Fond du Lac, Wis./Canada, Ltd./Australia Pty. Ltd.

or camper has relatively little weight to hold it on the highway, when compared with their area exposed to crosswinds. A trailer emerging from a tunnel or shelter of a roadside hill may suddenly be hit by a crosswind that forces car and trailer off the road or into the incoming lane.

Come out of protected areas cautiously and slowly when you are pulling a trailer. If there's a stiff side breeze, roll along slowly. Park when wild winds blow. There's no way to drive a big-area trailer safely under strong side-wind conditions.

Safer when you're towing? Let's go to that little round ball where your trailer and car become one—the ball of the hitch. According to the Society of Automotive Engineers, there are four classes of trailers:

Class 1. Nonpassenger trailers with a loaded weight of 2000 pounds or less.

Class 2. Nonpassenger trailers with a gross weight of 2000 to 3500 pounds.

Class 3. Nonpassenger trailers with a gross weight of 3500 to 5000 pounds.

Class 4. Nonpassenger trailers that weigh more than 5000 pounds.

Why "nonpassenger"? Because common sense and state laws say carrying passengers in a moving trailer is wrong and dangerous, SAE people use the term "nonpassenger" trailer to remind everybody that trailers should never be used for hauling people.

According to the SAE, your trailer is a Class 1, 2, 3, or 4, depending upon the weight you are pulling. The coupling of your trailer should be stamped: "Meets SAE Standards for Coupling Designation No. ____." If that is not on the unit somewhere, and you can't get firm information about the class trailer the hitch is capable of hauling, don't use it.

SAE also points out you should have at least one welded-steel safety chain (wise heads in the trailer-pulling business use two) that has a breaking-test load equivalent to the maximum weight of your trailer when



"Cab-over camper owners seem to have become wise to the need for two mirrors . . . essential to good driving practices on the highways."



"A trailer emerging from a tunnel or shelter of a roadside hill may suddenly be hit by a crosswind that forces car and trailer off the road or into the incoming lane."

loaded. If you're buying a new rig, the selling company should be able to tell you the breaking-test load figure for its safety chain.

If you're buying safety chain for a used rig, be certain of the test load before you use it. Make sure your hitch is welded to the frame of your car by a first-class welder. Don't hook it to your bumper, which, in many instances, isn't held in place too firmly.

If you're renting a trailer, you'll be given a bolt-on hitch. Make sure the hitch is so well locked in place that you'll bet your life on it.

Friction causes balls to break off hitches. Be sure the socket is well lubricated with grease before you hook it in place over the ball.

Don't tow a rented trailer without brake and turn-signal lights on it. Not only are you a hazard on the highway but you may be legally responsible if rammed from behind. Many rental agencies don't offer the necessary lights.

Make sure your mirror gives you a clear view of following traffic. Most house-trailer towers do have both right and left-hand outside mirrors so they can see cars approaching on either side. Some boat pullers do this, but few people pulling rental units do. Cab-over camper owners seem to have become wise to the need for two mirrors, which are essential to good driving practices.

If you haven't backed a trailer before, learn how before you pull onto the highway. Find yourself a parking lot and practice until you're a pro. You're bound to get into situations where you'll be glad you are.

★★★



NEW CONCEPT in camping trailers is Apache's "solid state" construction which features solid walls and roof of ABS thermoplastic

Great New Ideas for Motor Camping

By JAMES M. LISTON

CAMPING ON WHEELS in '71 will be safer, more convenient and buyers will get added years of use from their equipment—thanks to many worthwhile ideas introduced this year. On this and following pages you find some of the best.

NEAT AND CONVENIENT are Apache's self-storing power cord (top left) and removable, easily cleaned plastic storage bins (left)



FLIP-DOWN TAILGATE stretches Nimrod's 12-foot, 8-inch length to almost 19 feet when fully opened. Aluminum-topped trailer can sleep eight

Great New Ideas for Motor Camping *Continued*



BOAT LIFT for pickup truck, station wagon or sedan loads boat (up to 14 feet) and motor in upright position. Geared winch and hydraulic system weigh approximately 150 pounds and can handle up to 500



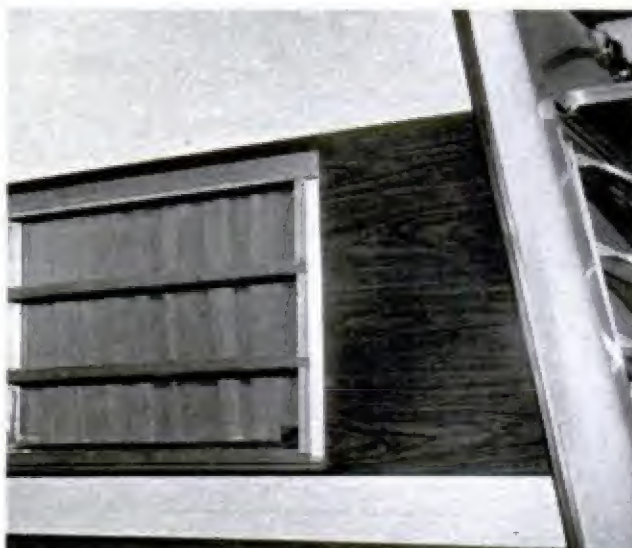
pounds. Winch-A-Boat leaves vehicle free to pull a camping trailer. Boat is launched at water's edge, using ramp system. Nonhydraulic model also available. Write Winch-A-Boat, Box 32, New Haven, Ind.



"TAG AXLE" gives stability, better handling to a 22-foot, truck-mounted camper. Adjustable air suspension on each tag-axle wheel lets you vary load distribution to meet road conditions, loading of total rig. Pressure gauges and compressor are in rear of truck. Holiday Rambler Corp., Wakarusa, Ind., 46573, makes it



HIGH AND DRY, cartop tent provides station wagon owners a bedroom for five adults—or a flock of kids. When the aluminum top is raised by a winch, 10-ounce duck canvas with fiberglass screens falls into place. Unit weighs 186 pounds, is 14 $\frac{1}{4}$ inches high when closed. Camp Queen, \$395, is made by Bennett & Co., Box 394, Chino, Calif. 91710. A larger model now available for vans is priced at \$450



NEW METHOD OF FASTENING TRIM has been developed by Coachman Industries, Middlebury, Ind. 46540. It eliminates surface-mounted screws and caulking on window and door frames. Foamed weatherstripping replaces the caulking (source of black stains on most coaches) and a polysulfide mastic bonds the trim to body. Stainless-steel, automotive-type trim (right) is designed to eliminate "dimpling" caused by screws

After the unveiling of his latest sculpture, Emile Gouche impressed the crowd by hand-painting his own cigarette.

Now everybody will be smoking Emile's hand-painted cigarettes



...almost everybody.



©1971 R. J. Reynolds Tobacco Company, Winston-Salem, N.C.

Camel Filters.
They're not for everybody.
(But then, they don't try to be.)

20 mg. "tar," 1.3 mg. nicotine av. per cigarette, FTC Report Nov. '70



Great New Ideas for Motor Camping *Continued*



REAR DECK of 21-foot Road Rover is for dune buggy, snowmobile, trail bikes, boat or fishing gear; sleeps four to six people. Hitch weight is 500 pounds with

deck empty; deck has 1000-pound capacity. Made by Sterling-Salem Corp., Marcellus, Mich. 49067; three-axle model by Trans-por-teer, Box 1341, Elkhart, Ind.



SLIDE-OUT KITCHEN that can be used without opening trailer top has icebox, sink, water pump, two-burner propane stove. Oasis III Deluxe (Camel Trailers, 329 S. Central St., Knoxville, Tenn. 37902) has three double beds, sleeps six to eight, costs \$995



LOW-PROFILE TRAILER with fifth-wheel hitch that puts weight over a truck's axle can legally carry passengers in most states. The trailer fits in a standard garage, unhitches in minutes, freeing the pickup for errands. The fifth wheel can be unbolted from the truck bed. This combination has the stability of a tractor-trailer rig. LoPro Truk Traveler, Wheel Camper Corp., Box 488, Centerville, Mich.



FRONT-SECTION COMPACT is ready to take any chassis-mount camper its size. The B300, 127-inch-wheelbase Dodge Sportsman has a 360-c.i.d., 245-hp V8 engine. With automatic transmission standard, the cost is about \$4000. Because the Compact sells for less and saves cutting away the van body, it's ideal for those who want all-new chassis for the kit-built Motor Home for Under \$3900 (page 136, Jan. PM)

POPULAR MECHANICS

5 reasons to consider a

new Sea-Horse 125...

1. SPEED. Here's 125 horsepower with the same engine specs as our Stinger racing motors, which have set new performance records in the world's outboard racing and endurance competitions — the APBA Nationals ... the 6 Hours of Paris ... the 24 hours of Rouen, France.

2. POWER.

V-4 design means more power from pistons to prop. The short, rigid crankshaft develops less torsional resonance, so engine vibration and friction are reduced. Short, straight-in fuel induction paths are more efficient. And the Capacitor Discharge Ignition system is far hotter and more reliable than conventional systems.

3. QUIET. Sound technology is what's behind Johnson quietness. The 125's internally tuned exhaust system boosts power, but substantially reduces noise and gas consumption. And our patented Water-Shield silencing both cools and quiets. The exhaust very silently exits underwater through the prop hub.

4. LOOKS. Our low profile is a bonus of our V-4 design. The 125 just plain looks better with today's horizon-hugging boat designs.

5. PRICE. Our 125 tag is comparable to other top-of-the-line motors, but our price includes as standard equipment such features as hydraulic-electric Power Shifting with single-lever remote control. You'll also benefit from the slowest depreciation and highest resale value in the industry. In fact, you'll find that Johnson's price is right all the way down the line to our 2-hp. Just check with your Johnson dealer. Or write for free catalog: Johnson Motors, Waukegan, Ill. 60085, Dept. PM-571.



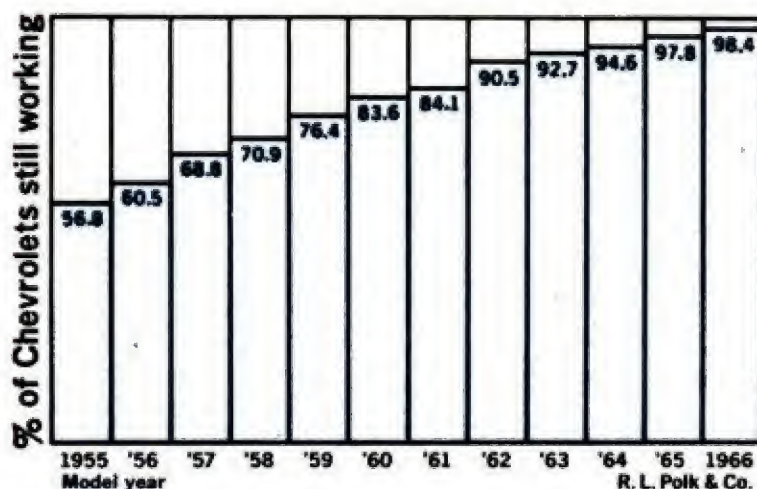
FAST COMPANY

Johnson

FIRST IN DEPENDABILITY Division Outboard Marine Corporation



Chevy campers last longer because we build them totally tougher.



The chart above, based on the latest official figures, shows how much tougher. More than 56% of Chevrolet's 1955 truck models, for example, are still going strong. No competitive make has as many as half its '55 models still running.

And today, Chevy's traditional toughness comes on even stronger. With fade-resistant front disc brakes standard on pickups. And no other camper can beat the totally smoother ride of Chevy's Super Suspension system. Or top the power of a Chevy V8 or standard 6.

Get a camper pickup that's got a real future at your Chevy dealer's now.



**Totally tougher
recreation trucks**



Goodyear GLAS-GUARD
... big on the road



The new fiberglass belted tire for Campers



New GLAS-GUARD tire: 2 fiberglass belts and 4 nylon cord body plies for extra protection.

It's big on the road.

The fiberglass belts fight tread-wearing squirm to give you long mileage.

The belts also hold the tread firm to give you command on wet roads, braking and cornering.

And GLAS-GUARD is also big off the road. Where rocks, ruts, potholes—

and breath-taking views—lie waiting, GLAS-GUARD's tough nylon body, combined with the fiberglass belts, wards off the blows.

Ask your Goodyear Dealer or Goodyear Service Store for the GLAS-GUARD tire. It could save your vacation.

GLAS-GUARD—TM The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR



Smart Ways to Improve Your Recreational Vehicle



By V. LEE OERTLE

If you don't want to trade in or buy a new RV, here's how to update the one you have

ADD BUILT-IN JACKS to your old camper; then you can unload the coach anywhere, freeing it for side trips

LET'S SUPPOSE you have had your camper, trailer, van or motor home a couple of years and it's still in great shape. Maybe you don't want to trade, but you've got the itch to do something to improve it. Perhaps you have already purchased about every available option, including a portable generator and an airconditioner. What then?

Cheer up! Here are 15 ways to spruce up any recreational vehicle to increase convenience, extend its free range, sharpen performance, and in general make it a better traveling vacation home.

● **Bigger tires.** The first step should be to examine the rubber. Check the tire size and rating. Have your RV dealer tell you what is the widest tire your particular model can handle. For example, hundreds


of thousands of pickups are still being sold with 7.50x16 tires, or with the smallest flotation units in size 8.00x16.5. Take a giant step toward improved stability by switching to the 9.50x16.5 or 10x16.5 supersingle, duplex-type tires. You'll need new wheels, of course, to go with them. Make sure you buy brand-name drop-center wheels for supersingle tires. Cheap imitations on the market sell for as low as *one-third* the price of specially-made flotation tire wheels. (\$9.95 vs. \$35, for example.) Cheap wheels negate the value of big tires; they're dangerous.

Many motor home owners can use the larger 12x16.5 tires. Wide tires increase traction, improve flotation and make a great difference in highway stability.

● **More water.** Most standard water tanks

1470-4 1 REYNOLDS TOBACCO CO. WINSTON-SALEM, N.C.

The long, long Springtime.



That's what you get with the extra length
of Salem Super Kings. And the Springtime
taste of NATURAL MENTHOL, not the
artificial kind, is yours in every extra puff.

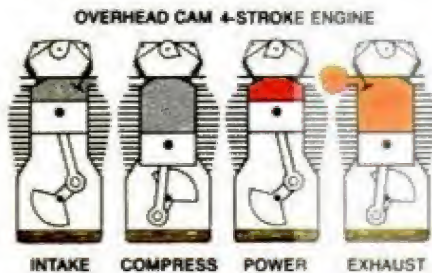
Salem Super King.



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Different strokes for different folks.

The Yamaha 650 XS-1B is for people who do a lot of in-depth comparing before they buy. It's different. Because it's the only production 650 around with a single overhead cam engine. And that can mean a lot if you're looking for a smoother running, more reliable machine.



The XS-1B's advanced overhead cam design is clean and simple. No pushrods to float the valves when you're cranking up high rpms. Nothing to keep you from getting every last cc of performance out of that big 650 four-stroke twin under your tank.

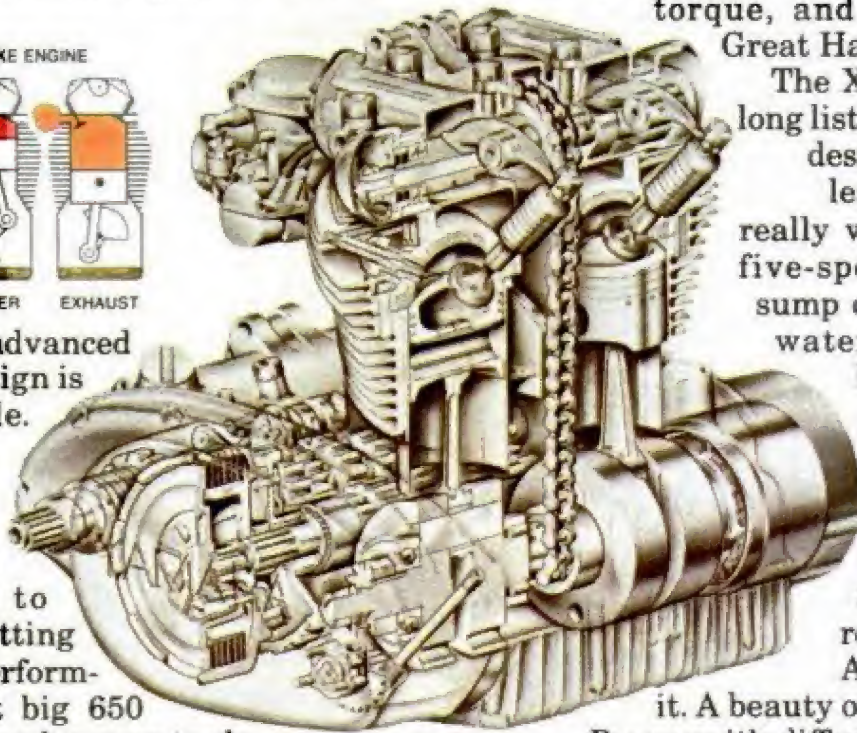
The entire engine assembly weighs only 135 lbs. And it displaces 653.3 cc to be exact, fed by two 34mm constant velocity carbs. Compression ratio is 8.7 to 1, with a 75x74 mm (2.95x2.91 in.) bore and stroke. At 6,000 rpm it's pumping over 40 foot pounds of torque, and at 7,000 rpm —

Great Hairy Ned!

The XS-1B also sports a long list of proven Yamaha design features. Like leakproof seals that really work. A wide-ratio five-speed gearbox. Wet sump oiling. Heavy-duty waterproof/dustproof brakes. And improved vibration-free handling — lighter-weight Enduro-type front forks and 3-way adjustable rear suspension.

And there you have

it. A beauty of a better machine. Because it's different.



Yamaha International Corporation • P.O. Box 660, Buena Park, California 90620 • In Canada Fred Deeley Ltd., Vancouver, B.C.



YAMAHA 
It's a better machine



EXTEND YOUR REAR BUMPER and add a trunk that will provide you with space for lots of spare gear

range from 15 to 20 gallons, occasionally to 30 gallons. An average family uses 5 to 8 gallons of water daily while vacationing, including water for drinking, cooking, bathing and sanitary flushing. Figure it out. At 5 gallons per day, a 20-gallon tank would last just four days. (If you think I'm overestimating, run your own survey.) Increase your range away from water supplies the easy way. Install an *extra* water tank under a bed, or inside a closet or storage bin. Place it on the floor and near the axle to minimize the effect of extra weight. I put a 50-gallon tank in my own trailer last year, and more than doubled my free time afield.

● *Larger holding tank.* Your sanitary system is pretty well locked into the limits of the holding tank capacity. Fifty gallons of water cannot be held in a 22-gallon holding tank. Since space under the coach frame is limited, replacement of the existing tank is best. Holding tanks up to 50 gallons in size are available.

● *Another butane-propane bottle.* Though many persons refer to LP-gas containers as "tanks," the trade calls them *bottles*. One 5-gallon gas bottle will hold enough fuel to fire a three-burner range and a gas lamp for about five to six weeks of three-meals-a-day usage. But when the same 5-gallon bottle is used to fire a gas refrigerator, space heater and water heater consumption will zoom to five or six *days* per 5-gallon bottle. What a difference! There are a couple of practical alternatives. You can replace the existing 5-gallon bottle with a 7-gallon size. (Most storage bins have a little extra bottle size.) Or add an

(Please turn to page 162)

INSTALL NEW SWAY-CONTROL DEVICE; load-equalizer hitch or trailer dolly alone can't eliminate sway
MAY 1971



BUY A HOLLOW BUMPER for your motor home or trailer in which to store easy-to-reach sewer hoses



INSULATE WATER LINES and holding tank with foam or fiberglass to avoid freezing during winter camping



REPLACE MANUAL WATER PUMP in an older coach with a modern 12-volt electric pump in a few hours



Everything you've heard about camper-pickup engines is probably wrong.

The Number One Source for pickup engine information is usually the guy in the next pickup.

Unfortunately, he's also one of the least informed sources.



He's had to get his information just as you've had to. By asking someone else. And because most pickup owners operate under a variety of popular misconceptions, what he knows for sure isn't always so.

Putting a car V-8 in a pickup doesn't make it a truck V-8.

Most pickups are powered by car engines. Not truck engines. And there's a very good reason why.

Pickup manufacturers, in order to keep costs down, use the parts they have on hand. In effect, they "rob" their other assembly lines. If their other assembly lines have cars on them, they use as many car parts as possible. That includes engines.

Our other assembly lines have trucks on them.

So many of the engines in our pickups are the same ones we bolt into our big, gas-engined highway rigs. They're engines specially designed for a long lifetime of heavy hauling.

A truck engine accomplishes more without working as hard.

Because truck engines are built to serve the needs of profit-minded businessmen, they have to meet certain criteria.

They have to last a long time. Ours do. They're made a little beefier than most engines, to withstand rugged use. And, as the chart shows, they develop their power peaks at lower rpm's than most engines. So they don't have to turn as fast—and wear as fast—as most other engines.

They have to be honest, and deliver the horsepower we promise. That's on the chart, too.

All engines have "two" horsepower ratings.

The one listed as "gross rated horsepower" is what the engine develops on the test stand. It's usually the horsepower used in advertising.

The "net horsepower" is what you wind up with, once the engine's in the pickup. It's a lower rating because of a horsepower loss in the accessories. You can't avoid losing some of it. All you can do is make sure you don't lose much.

We've taken precautions in that direction. International engines are designed to lose as little horsepower as possible.

What starts out to be a more powerful engine (205HP vs. our 193) ends up being less powerful (150 net HP vs. our 173). That's important to know when you're selecting an engine to fit your requirements exactly.

Just putting a truck engine in a pickup doesn't make it a truck.

There's more to building a rugged, reliable pickup than just engines. There are transmissions. Brakes. Suspensions. Exteriors. And interiors.

Manufacturer	Engine	Rated HP.	Net HP.
International	V-304 V-345 V-392	193.1 @ 4400 rpm 196.7 @ 4000 rpm 253.0 @ 4200 rpm	173.0 @ 3900 rpm 182.3 @ 3800 rpm 235.9 @ 3600 rpm
Manufacturer "A"	302 V8 360 V8 390 V8	205.0 @ 4600 rpm 215.0 @ 4400 rpm 255.0 @ 4400 rpm	150.0 @ 4000 rpm 177.0 @ 4100 rpm 180.0 @ 4000 rpm
Manufacturer "B"	307 V8 350 V8 402 V8	200.0 @ 4600 rpm 250.0 @ 4600 rpm 300.0 @ 4800 rpm	135.0 @ 4000 rpm 170.0 @ 4000 rpm 240.0 @ 4400 rpm

Like everyone else, we're taking from other assembly lines to give you these things.

But we're giving you something different.

Our 1210 Camper Special pickup has a leaf spring suspension at all four corners. It's standard equipment. How good is it? Think of it this way: a coil spring gives you one point of suspension per wheel. A leaf spring gives you two. As standard equipment, one popular competitive model has coil springs all around...a total of 4 points of suspension. Another, as standard equipment, has coils in the front, leafs in the rear...a total of 6 points of suspension. As standard equipment, an INTERNATIONAL® 1210 Camper Special has leaf springs all around. A total of 8 points of suspension. How many points of suspension do you want...4, 6 or 8?

International transmissions are built for trucks. So they're up to handling the big jobs. You can choose from two 3-speeds, two 4-speeds, a 5-speed heavy-duty, a 5-speed with overdrive, and a rugged 3-speed automatic.

Engines and transmissions are only the start of an option list that includes 4-wheel

drive, extra-duty electrical and cooling systems, a binful of rear-end ratios...and all the amenities like air conditioning, AM-FM radios, power steering and brakes, and more.

What's most important about all of them is that they go together to build a truck. Not just a pickup.



The International 1210 Camper Special pickup.

See it, test drive it at your International Truck dealer's.



INTERNATIONAL TRUCKS

International Harvester Company, 401 N. Michigan Avenue, Chicago, Illinois 60611.



SWITCH EXHAUST PIPE from single to twin system to increase performance, reduce heat load on engine



FOLDING TRAILER DOLLY tilts out of way for travel but provides good support for trailer at campsite



SUPERWIDE TIRES double the footprint and provide improved stability, extra flotation and more traction



BE SURE WHEELS CAN TAKE BIG TIRES before you switch to them. Wheel shown is for a 12 x 16.5 tire

WAYS TO IMPROVE YOUR RV

(Continued from page 159)

extra 5-gallon or 7-gallon gas bottle and double your fuel range afield. It's comforting to know your fuel capacity can outlast a five-day snowstorm.

- *Better heating.* Thousands of standard coaches without space heaters have been sold. Suffer no longer. You can get a small space heater that fits into unused closet or floor space, is modestly priced and very efficient. You can even get one for your tent trailer. My Apache Mesa had one, complete with a vent-plate sewn into the fabric wall.

- *Instant water heater.* Did you know you can obtain a flash heater for your coach water system? For somewhere around a hundred bucks, you can find one that lets you wash in warm water, or run a cupful for coffee or tea just by turning a tap. It's instantly ready. This compact unit hangs on the wall like a decorator item. If you're an inveterate hot-drink camper, here's how to eliminate midnight pumping, firing up the range, or running a hot-water heater all night just to have a little hot water on cold mornings.

- *Added storage space.* If your coach seemed a bit overstuffed on your last vacation, you need more storage space. You can cut through *the outside wall* into a closet or under the bed area with a sabre saw. Ready-made bin-doors complete with piano hinge are available at ridiculously low prices. See your coach repair

(Please turn to page 166B)

GET A **FREE** AUTOMATIC TRANSMISSION ON THE DODGE TRAILBLAZER SPECIAL PICKUP.

THAT'S \$247.70 OFF THE MANUFACTURER'S SUGGESTED RETAIL PRICE.

The Trailblazer Special is a specially equipped D200 pickup designed for campers.

When your Dealer orders a Dodge Trailblazer Special, we throw in a free automatic transmission. The special

equipment includes the following items:

- Special trim on the seats ■ Door pocket
- Color-keyed floor mat ■ Radio ■ Tinted glass ■ Cigar lighter ■ Undercoating
- Extra moulding and exterior trim
- Dual bright 5" x 7" rearview mirrors
- Dual electric horns ■ 60-amp alternator
- 70-amp-hr battery ■ Increased cooling
- Brake booster ■ Oil pressure gauge
- Camper electrical package ■ Quick-removal tailgate ■ 4,500-pound-capacity

mechanical jack ■ Camper special emblem. Act now! Offer is for a limited time only.

Optional extra-heavy-duty package, a Dodge exclusive.

This extra-heavy-duty package boosts the GVW rating to 8,500 pounds (the highest rating you can get for a ¾-ton pickup).

The package includes: 525-pound-capacity auxiliary springs ■ 9.50 x 16.5-D 8 PR tubeless front and rear tires ■ 12" x 3" front and rear hydraulic brakes ■ 3,800-pound front axle ■ Heavy-duty front and rear shock absorbers.



CHRYSLER
PACIFIC CORPORATION

BONUS OFFER

Get *The Complete Book of Motor Camping* at your Dodge Dealer's. This 160-page camping guide is full of helpful information about campsites, equipment, maintenance, and other outdoor living hints. Written by Lyle Kenyon Engel, noted authority on camping and sports activities, this useful book regularly sells for \$2.95. But there's a FREE copy waiting for you at your Dodge Dealer's. Simply bring in this coupon and your local Dodge Dealer will be happy to give you a free copy of *The Complete Book of Motor Camping*.



Camping '71 Shopping Guide

CONWED UTILITY BLANKET

FULL 40"x79" SIZE

- **INSULATED**
Keeps you warm & cool
- **MOISTURE PROOF**
Keeps you dry & comfortable
- **DISPOSABLE**
Keeps you clean & fresh
- **STRONG**
Keeps you safe & secure



CAMPERS—PICNICKERS BARGAINS!!!

This new disposable Utility Blanket that provides insulation and is waterproof has a 1001 uses around the home, car and yard. This "jack-of-all-trades" serves equally well as Mom's picnic cloth or Dad's stadium cushion/blanket.

Each blanket is individually sealed in its own polyethylene bag and folds to about 10 1/2" square—just right for picnic basket or glove compartment.

Cost per blanket is only \$1.49, postpaid (less than cost to launder an ordinary blanket). If you order 4 blankets for only \$5.65, we'll send you a camper's Swardfish knife (has multiple uses) absolutely FREE. Retail value of the knife is \$1.95. Many other Camper specials on request.

MASTER PRODUCTIONS
Box 725, Stone Mountain, Ga. 30083

BUILD YOUR OWN CAMPER

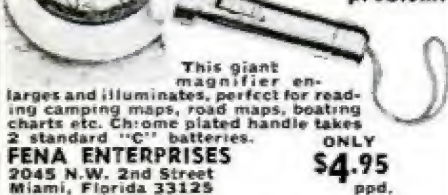
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- PATTERNS • KITS
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3 oz. electronic deactivator to be used in cars or trucks. Prevents theft by making it impossible to jump starter. "hot wiring" ignition, using master keys or other common techniques of theft. All silicone solid state electronic circuitry. Easily installed in minutes with absolutely no drilling, wire splicing, or alteration of existing wiring in car. Full instructions included.

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GOV'T. SURPLUS ELECTRONICS VISUAL IDENTIFICATION SET

Pictured left—Used by aircraft or ground units—gives an extremely bright flash of light that can be seen by air in daytime for 3 miles, or 1 mile on ground. Operates from 12 volt DC storage battery. Ideal for campers, explorers, boats, etc. Shipping Wt.: 50 lbs. **\$29.95**

GRAB BOX OF ELECTRONICS
Electronic parts, equipment, assemblies, new & used useable motors, resistors, condensers, coils, transformers, relays, switches, circuit boards, etc. Only 10¢ per lb. in multiples of 50 lbs. **\$6.71M**
Send payment with order. Freight charges collect. No C.O.D.s

F.R.S. CO., BOX 1105, LIMA, OH. 45802

POCKET KNIFE

Has razor sharp steel blade, fish scaler, bottle cap lifter, shackle & hook disgorger, White pearlized handle.



only
\$2.00
ppd.

CROSS ROADS, Dept. P-5
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AUTO EMERGENCY SAFETY KIT

Complete roadside emergency kit in its own handy storage case. Booster Cables, Flashlight w/batteries, Instant tire repair, Accident Check List, First Aid Supplies, 2 Screwdrivers, Fluorescent distress flag and much more. You can't afford to be without one. Act Now! Send only \$9.95 PPD. Satisfaction Guaranteed.



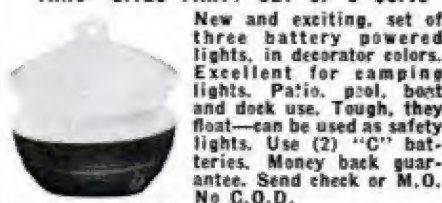
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IN ONE SMALL STORAGE
CONTAINER!

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CLEAN
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Don't Pay high labor charges. Send for this amazing booklet. Stemag Enterprises, 1052 Greenwood Avenue Akron, Ohio. 44320. **\$1.25** postpaid.

THRO—LITES PARTY SET OF 3 \$5.49

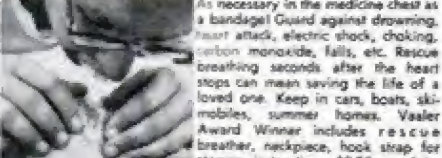


New and exciting. set of three battery powered lights, in decorator colors. Excellent for camping lights. Patio, pool, boat and deck use. Tough, they float—can be used as safety lights. Use (2) "C" batteries. Money back guarantee. Send check or M.O. No C.O.D.

DUNLAVY CO., Dept. 255,
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**Simple Device Assures
Successful Mouth-to-Mouth Rescue**



As necessary in the medicine chest as a band-aid. Guard against drowning, heart attack, electric shock, choking, carbon monoxide, falls, etc. Rescue breathing seconds after the heart stops can mean saving the life of a loved one. Keep in cars, boats, skis, mobiles, summer homes. Vastly Award Winner includes rescue breather, neckpiece, hook strap for storage, instructions. \$2.25 complete.

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DYNALITE

World's most powerful flashlight. 93,000 candlepower, blazes its beam a mile. Uses 6 standard "D" cells, only 10 in. long, dentproof, waterproof, 1 yr. guarantee. #015—in white or gray—\$8.95. #017—with variable brightness switch—\$9.95, black only. **DYNACHARGER**—recharges batteries right in the light—\$6.95. Special offer—#015 Dynalite & Dynacharger—\$15.00. Calif. res. add 5% tax. **Monark Enterprises, 2267 College View Dr., Monterey Park, California 91754.**



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PLANS—Pickup Campers \$4.95; Pickup Covers \$3.95; Travel Trailers \$4.95; Vanette conversions \$3.95; Bus conversions \$3.95. Huge 166 page Supplies, Parts, Equipment Catalog with discount prices \$1.00 (refundable). Literature for Camper, Cover, Trailer **KITS** 25¢. Order **PLANS**, 166 page catalog, KIT literature from this advertisement.

SAVAGE,
Box 377C, Savage, Minnesota 55378

WAFFLE DOG IRON

Bake wieners-on-a-stick. Makes 2 waffle dogs in minutes. Use on stove or charcoal grill. Recipes and directions. **\$5.98 PPD.**

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Order one or both of these travel guides **HOW TO TRAVEL WITHOUT BEING RICH**—Around the world on \$1,000 and many other fantastic travel bargains. \$2.50. **HOW TO TRAVEL—AND GET PAID FOR IT**—Fabulous travel possibilities for those who hanker to see the world. \$2.50. (Postpaid. Add 5% Tax if Calif. Res.) **KENWORTH GIFTS,** 1020 Kenbridge Ct., Sunnyvale, CA 94087

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AMAZING Ball inflates to full 21" life preserver in seconds upon contact with water. **ABOUT** baseball size and can be thrown as far. Will support 250 pounds for hours. A real life saver. The price is \$7.95 plus \$.50 postage. **MONEY** back guarantee.

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ANCIENT ROMAN CHESS SETS

These superb, minutely detailed collector's sets are exact copies of classic Roman sculpture. The King is Augustus; the Queen, Livia; the Bishop, Cicero. The King is 4 1/2" high. Heavily weighted, felted Catalin pieces in Alabaster white and Granite grey. Large 16 1/2" board. Leatherette chest. 16-page historical book & rules. **\$1495**

Same figures as above—hand antiqued gold & silver. Black & gold board. Simulated Morocco Chest. **\$2995**

4 1/2" King, weighted & felted figures. Board, book, leatherette gift box. **\$995**

4 1/2" King, felted figures, board, book. **\$695**

Plus \$1.00 per set PP & Hdg
RIVER VIEW HOUSE
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Camping '71 Shopping Guide



\$5,000.00 IN CASH PRIZES!

Big crossword puzzle contest of skill. Rush dime for entry blank and full details.

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Buy from Mfr. & Save \$60! Complete frame, no welding & painting needed, just assemble & install your favorite engine. Model S-200 as shown\$55. (a.s.)

Other models from \$45

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Free catalog

MOTORISTS!

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The Ranger © **ANTI-TAILGATER**

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FISHERMEN... NEWEST SENSATION!!



Fishermen! Now you don't have to kill that thrashing fish! To remove hooks, slip on "GAFF-MITT". This is a really new product which helps you eliminate "Hook-Injured" and "Pin-Spiked" hands. You also use for landing fish as well as holding and cleaning. Special design gives you lifetime plastic spurs, placed in your Exact Grip Areas. Two fingers are open to allow water "flow through" for your underwater use and also for line handling. Special coated surface and easily reversible for cleaning. Slotted for belt-loop strap. A Must for all types of fishing! To order, specify: men's or women's, large or medium, right or left. Send only \$3.75. Satisfaction absolutely guaranteed!

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tells you what to see and where to go in every corner of the U.S. Lists scenic roads, important sights, best places to eat and stay. This big book—170,000 words, is as large as 3 novels! Discover this great country by car. #HP-20T, only \$3.50.

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opens 3 inch jars to nail polish bottles, and reseals. Geared handle gives the leverage—a child can use it. Steel construction, chrome finish. Only \$2.98 postpaid and guaranteed. Calif. residents add 15¢ sales tax.

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Styrene wood-grain board. Flexible Stainless Steel fillet knife w/leather sheath. \$9.75 Post. Paid.

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SABRE-SAW OPENING; add flanges, bin door from trailer supply to make an outside-access storage box



DOUBLE YOUR LP-GAS SUPPLY by adding a second gas bottle and installing switch-over valve connection

WAYS TO IMPROVE YOUR RV

(Continued from page 162)

shop or local trailer dealer. An outside-access storage bin is extremely handy for muddy boots, wet clothing, fishing creels, upland game and other items that would be unpleasant inside the coach. Box-in the compartment with lightweight paneling and the job's done.

Even in the limited enclosure of a camper coach, you can box-in those wall-to-ceiling corners and add extra wall shelves very easily. Do the same in the cab-over bed section. Wherever you find unused wall space, add a shelf. On motor homes and trailers you can add a back-wall trunk. Simply build a wood or metal framework, attach it to the rear wall and cover it with matching metal. A friend of mine built a lightweight metal frame, attached it to the back trailer wall and covered it with prepainted aluminum in one day. The next morning, he sealed the edges and installed a ready-made bin door picked up from a local trailer supply.

● *Built-in camper jacks.* If you own a pickup camper, you'll increase the convenience of your equipment if you install a set of built-in loading jacks. With them, you can remove the coach from the camper, save considerable fuel, and free the truck for other duty. Sometimes it's desirable to unload the coach at a campground to free the pickup for hunting and fishing side trips. The jacks don't rob coach space, and you can't forget them. Everywhere you go, they'll be handy.

● *Eliminate swaying.* A load-equalizer doesn't automatically stop fishtailing. An equalizer hitch is designed to distribute heavy tongue loads to car and trailer areas better able to handle it. To eliminate swaying you need a sway-control device. This consists of a sliding arm restrained by friction-pads. Tension on the pads is adjustable to provide a dampening action at the exact level you need. For light loads, all you need is light tension to prevent feedback and whipping. There is also a sway control that operates hydraulically. Test a sway-control device with your load-equalizer to learn the difference.

● *Check trailer attitude.* Hitch up your trailer with a normal vacation load and full water tank, and park it on a level pad. Step back 50 feet and drop down on one

(Please turn to page 186)

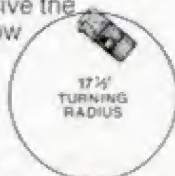
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And with its V-6 powerplant, the Universal is \$93 less than last year. Yes. It's priced to make the Bronco, Blazer and Scout seem far out—in price.

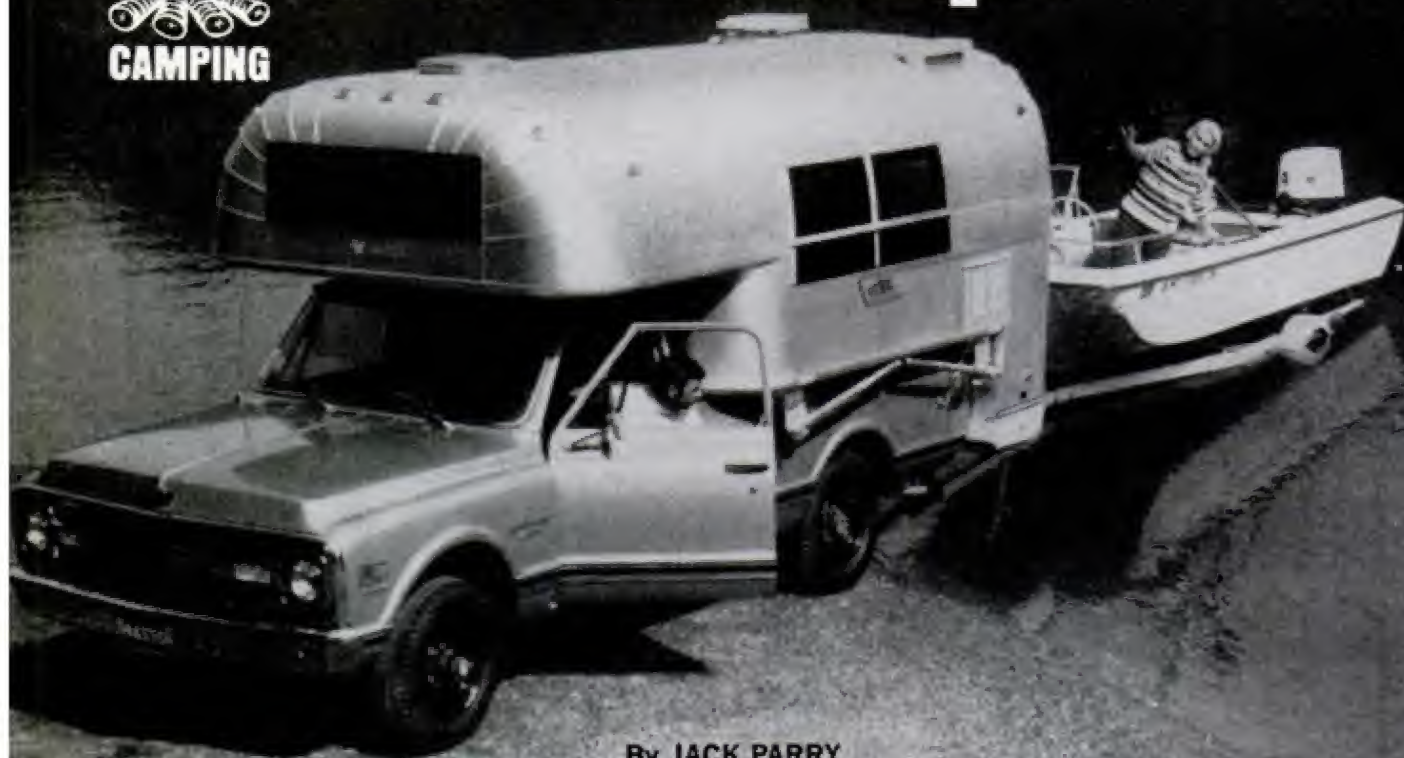
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How to Match Your Truck and Camper



By JACK PARRY

There are limits to what any truck can carry. Here are some common-sense rules to avoid overloading

IT'S A TRUCK, isn't it?" says the beginning outdoorsman as he loads everything but the kitchen sink aboard his newly purchased camper-pickup combination. Too often he finds to his dismay that he has a load the vehicle can't possibly handle. The moral of the story is that just because a coach will fit into the bed of a pickup does *not* mean that it is the right one to match with the truck—or that the truck is the right one to carry all the gear the vacationer might demand.

If you *already* own a pickup truck and want to use it for camping, you are limited to the coach size that truck model can reasonably carry. Alternately, you can choose the camper you want and then buy a truck that can handle it. You don't hunt water buffalo with a .22 rifle, and you don't heap a load on a half-ton pickup that is intended for a three-quarter-ton truck.

The key to matching camper and pickup is contained in the GVW—gross vehicle

weight. This is the total of your truck's weight plus its total load including passengers. "Payload" is the *difference* between the weight of the vehicle and the GVW.

A half-ton pickup of 5000 GVW can carry a camper and equipment that won't exceed a payload of 1400 pounds. By adding overload springs and heavier rims and tires you can increase the payload *if the truck has sufficient rear axle capacity*. Don't gamble; get the manufacturer's specifications from your dealer.

An over-cab camper is usually mounted on nothing less than a three-quarter-ton pickup. With this you can handle up to an 11-foot camper with a payload of 3300 pounds. Your cost is only a few hundred dollars more than a half ton and the choice of camper models and floor plans available makes it possible to get a coach practically tailor-made for your needs.

If you plan to haul an 11½ to 14-foot camper, you'll need a one-ton pickup that

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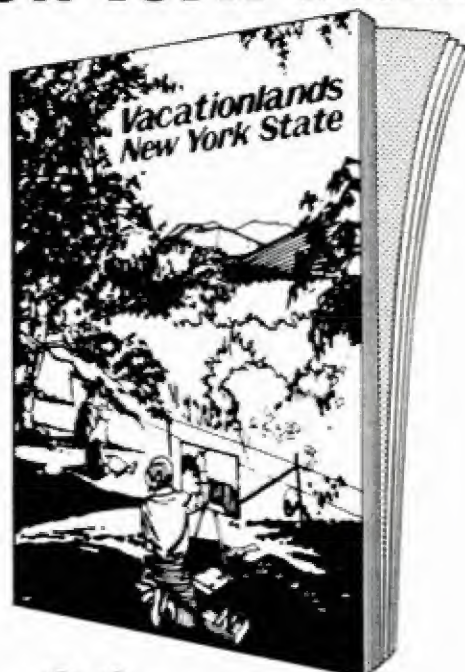
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COMFORTABLY LOADED CAMPER (top) is also shown listing badly to the rear (below) because of a party inside. Overloading in this way is quite dangerous

can carry up to 6000 pounds. These large trucks are available in four-door, "crew-cab" models that seat six.

After you've selected a camper, two factors are critically important in deciding how much payload capacity you'll need: the weight of the extra stuff you'll want to carry and how it will be loaded. You *can* overload a pickup—in the front, in back or in the middle. And everything, from catsup to cameras, has weight.

Don't make the classic mistake of calculating the empty weight of the coach and "guesstimating" the total poundage. Many beginners don't realize that much weight is hidden. A water tank, for example, *really* adds to the total for water weighs 8½ pounds per gallon. Then, if you add fresh water without emptying your holding tank, you're compounding this weight.

Individual items of clothing don't weigh much, but did you ever carry an *armload* of them? Canned goods add to the poundage. You can hide a lot in a compact ice-box. Maybe Dad takes along his outboard motor and fishing tackle. You could be overloaded and not realize it. Or—equally important—you could be improperly loaded with weight in the wrong place.

As Robert C. Honke, manager of truck sales training and recreation for Ford, points out, a truck should be a teeter-totter in reverse with the weight distrib-

WHAT WILL YOU CARRY?

This weight tabulation chart will help you match truck and camper. Fill in the blanks and total to determine how much payload capacity you will need. Typical weights for some items are listed below.

Camper body weight (dry)	_____
Driver and passengers	_____
Water and tanks	_____
Propane, ice, batteries, etc.	_____
Auxiliary fuel (tank and gas)	_____
Trail bike or boat trailer	_____
hitch; weight and tongue load	_____
Sporting equipment	_____
Tools, tire chains, etc.	_____
Cooking utensils, cleaning items	_____
Clothing and bedding	_____
Miscellaneous	_____
Total	_____

TYPICAL WEIGHTS

Item	Lbs.	Item	Lbs.
Air pump	3	Guns	15
Aux. fuel tank	310	Lantern	3
Barbecue grill	5	Lawn chair	8
Bedding	54	Leveling jacks	20
Boat (10 ft.)	90	Minibike	120
Boots	10	Motorcycle	200
Camper top carrier	30	Outboard (10-hp)	75
Canned goods	40	LP-gas tanks	50
Charcoal	20	Radio	5
Cleaning items	20	Sleeping bags	32
Clothing	50	Toolbox	30
Coleman fuel	15	Tire chains	15
Dishes, pots	50	Trailer hitch	25
Extension cords	3	TV	25
Flares	5	Two-way radio	10
Flashlights	5	Water (50 gal.)	415

uted *equally* at the axles. Assume you buy a three-quarter-ton pickup with a factory-rated GVW of 7500 pounds. The truck itself weighs 4230 pounds with the main weight under the hood. The rear end is lighter, providing the best capacity for carrying a payload. Subtracting the weight of the truck from the GVW, you get 3270 pounds. The payload should be distributed principally toward the rear cargo area.

Adding a popular-sized 10½-foot camper is okay, for this weight pushes down between the pickup's axles—it is positive for both. "But," says Honke, "to make their pickup palace livable many campers fill their 30-gallon water tanks and put another 8 gallons in the water heater. Some of the weight is now taken away from the front because of the weight pushing downward at the rear *outside* the truck's axles. In effect, the rear axle becomes a fulcrum."

Then you and your wife add a couple of



**Does your camper wallow,
wobble, bounce or bottom?
Maybe it's trying to tell you
something about the tires.**

If you've added extra weight to the normal loads you carry — a camper, for instance, your pickup camper will tell you by the way it acts. When that happens, head for an expert fast. Your Firestone Dealer or Store. (There are thousands across the country.)

Let this Firestone expert analyze your axle loading and suggest the camper tire that is right for you — in type and size and load range.

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For a free load analysis, see your Firestone Dealer or Store. Because you want to be sure when it comes to tires.



New truck tire for campers —
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GOOD REAR-VIEW VISION is needed by any driver, but especially so in a truck camper. Check mirrors!

butane tanks, load up the refrigerator and cupboards. Dishes, bedding, fishing tackle add to the weight. Perhaps your daughter weighs 75 pounds, your wife 125, and you and your son 250 pounds combined. By now there is just 136 pounds of allowable additional payload for your first trip.

Ready for bigger things on your next outing, you add a trail bike to the rear bumper and put an outboard motor in the closet. You decide to haul your boat, too, for some fishing. You notice your rear tires look low even though you had enough air in them—and suddenly it dawns on you that you're overloaded in the rear.

It might be better to restrain an impulse to take the spare tire from the rear and mount it in front of the grille. Although this redistributes some weight, it also helps the engine overheat by keeping air from the radiator.

"It's a truck, isn't it?" you say, and proceed to add an airconditioner, auxiliary gas tanks and probably a step bumper and camper jacks. You're within 100 pounds of the capacity of your front springs and you've *exceeded* the capacity of your rear axle by 18 pounds—that's axle, wheels, bearings and everything.

If you stay on smooth roads you may luck out with nothing more serious than excessive wear on tires, bearings and suspension system. But just hit a bad bump or chuckhole! You're a likely candidate for a blowout or rim or axle failure.

According to Ford's RV expert, normal shifting of weight can also be a problem. A full water tank forward and empty 12-

gallon holding tank aft often make for a balanced unit. But when the holding tank is full, the net effect is to overload the rear end by 85 pounds.

When selecting and outfitting a pickup camper, make sure you know just where family members will sleep. Manufacturers sometimes get carried away in talking about how many people their unit will sleep. Occasionally they seem to think in terms of midgets, *not* full-grown adults.

The camper's aluminum skin should have no visible gaps or bulges in the metal which indicate poor workmanship, and no protruding nails, screws or rivets. There should be no exposed gas lines which might be crushed or electrical leads that could be torn loose underneath the coach.

Inside the camper: Is the floor covering good-quality, easily cleaned material? If carpet, it should be washable indoor-outdoor material. Ask about insulation. Walls should be 1½ inches thick (2 inches preferred); ceilings twice as thick. Windows should work smoothly; closets and toilet close positively without rattling; drawers run evenly and have stops to hold them closed.

While you can't compare a \$1200 unit to one at \$5,000, careful shopping can help you get the most for your money. Look outside the coach for RVI, TCA or MHMA seals. Each means that the manufacturer has complied with that group's codes in electricity, plumbing and heating.

Finally, in matching the camper to a truck, you should:

- Not assume that the truck salesman is a recreational vehicle expert. Ask to see his printed GVW ratings.
- Know that besides the dry weight of the



THIS BIG CAB-OVER CAMPER is properly mounted on three-quarter ton truck but can still be overloaded

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camper you'll be adding an assortment of equipment—plus people.

- Know the GVW of the truck you intend to buy—or already own—and when you mate a camper, leave yourself a good margin for extra weight.

- If at all possible, actually weigh the truck and camper *before* you buy it and then weigh *everything* you intend to put in it. (Don't forget water weight.) Scales

are available at grain elevators, truck stops and state-owned facilities on highways.

- Keep in mind that some auto dealers rent pickup/camper combinations by the day or week. Try one to get an idea of what's right for you before you buy.

- Remember the gross vehicle weight formula for finding your payload—and stick to it! ★★★

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1000 or under	D100; light campers with various GVW and payload options.	F-100 with various GVW and payload options.	Various light pickup options.	1010 series; 8-ft. campers, non-cab-over. GVW 4800; curb weight 3625.
1000-2000	D100; 8-ft. camper, non-cab-over. GVW 5200; payload 1500. Various engine and axle options.	F-100; GVW from 4200 to 5600; payload 1345 to 1600.	CE 10000 series ½-ton pickups; 6 or 8-ft. non-cab-over. GVW 5400; payload 1000. Various engine, spring options.	1110 series with max. GVW package; 8 to 9½-ft. campers, non-cab-over. GVW 5400; curb weight 3725.
2000-3000	D200; 8 to 10½-ft. campers with or without cab-over; rear overhang; payload 3100. Many GVW options.	F-250; up to 11-ft. cab-over, rear-overhang campers. GVW 6900; payload 2850. Many options.	CE 20000 series ¾-ton pickups; cab-over, rear-overhang, depending on model; 8 to 11-ft. campers. GVW 6700 or 7500; payload 2400 or 3100.	1210 series with 7500 GVW package; 9 to 10½-ft. cab-over, rear-overhang campers. GVW 7500; curb 3830. Optional camper special with 8200 GVW.
3000-4000	D300 crew-cab; up to 10½-ft., cab-over, rear-overhang camper; payload 3295. Various GVW options.	F-250; 11-ft. cab-over, rear-overhang. GVW 7500; payload 3325.	CE 31000 series 1-ton pickups; 9 to 12-ft. cab-over campers with rear overhang, depending on model. GVW 8000; payload 3350.	1310 Camper Special; 9 to 11-ft. cab-over, rear-overhang campers. GVW 9000; curb 5165.
4000-6000	D300 chassis-mount.	F-350 chassis-mount.	CE 31000 series 1-ton pickups with GVW 9000; payload 4550.	Various chassis mounts.

*Although trucks can be practically custom-made to meet your requirements, this chart lists basic models and indicates the weight (in pounds) they can handle. Remember that heavier axles, springs and bigger engines are usually available and give any particu-

lar model a wide range of GVW and payload ratings. In all cases, you should check with the dealer for exact figures. International conservatively rates payloads, but by subtracting curb weight from GVW you can get a reasonable idea of truck capacity.

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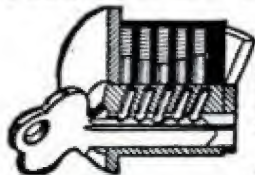


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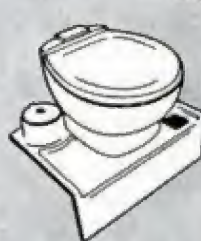
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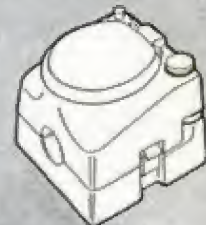
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As a DURACLEAN Dealer you are the sole owner of an independent business and your own boss. You keep all the net profits for yourself. However, the franchise we supply gives you instant recognition in your area. You operate under a nationally known name—use a process recommended by the nation's big carpet manufacturers and guaranteed by Parents Magazine. You get training BEFORE YOU BEGIN. You receive guidance and help from your headquarters.

Your training shows you how to perform the cleaning service—plus six other services which bring extra profits. You also are trained in all phases of running your business, including how to get customers, how to control your expenses, and how to make the maximum profit.

From your first job, you can start earning far more each hour than most men earn. As you add servicemen or servicewomen, we pay for your additional equipment, so you



can expand rapidly with no further capital investment... and each helper you add can increase your yearly net profit by several thousand dollars.

Here is a business that can pay you far more per week than the average man now earns—with only the talent and ambition you now possess. Here is a business you can operate in any one of three ways—or progress from one to another. Some men operate permanently in spare time for the extra money they need. Some start in spare time and quit their jobs only after they see that they can make a lot more money than their present pay by putting in full time as a Duraclean Specialist. Others render the service with servicemen while they expand their list of customers. How much can you earn? That depends on how much time and effort you want to put in. Working full or part time, men can and do take in \$5,000, \$10,000, \$15,000, \$20,000, \$25,000, and much more. As you add servicemen, your income is unlimited! We have part time dealers so limited in the time they can give to their dealership that they take in less than \$5,000 annually, yet they find this added to their salary provides a much higher scale of living. Exceptional full time dealers can and do exceed \$50,000.

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Safety fan helps pedestrians cross busy streets

A folding, fan-shaped sign makes pedestrian crossings safer, according to its Belgian inventor. When unfolded, the fan displays the international pedestrian-crossing symbol.



Electronic protector

A watchman at a single command post can keep an eye on an entire building with Honeywell's new Alpha 3000 integrated protection system. Electronic "watchdogs" scattered throughout the building detect fire, vandals, burglars, and equipment breakdowns—then relay the information to the command post via TV screens and printers. The Alpha system shown here even gives the guards a read-out of instructions to handle any emergency. It can also be programmed to perform tasks, then check to see if they're done.

Flip-down wheel

A steering wheel that flips down when it's hit by a driver's chest keeps his face from contacting the wheel rim in a low-speed collision, according to its developer, Robert Curcuro, president of Martech Corp. Demonstrating the wheel, Curcuro contacts the bottom of the wheel (right), and it deflects so his face does not hit the rim (far right). The hub cushion further absorbs energy.



Most people buy small trucks for the same reasons they buy small cars.



They eat less gas. Occupy less space. Are cheaper to maintain. Easier to handle. And cost much less to begin with.

In addition, some small trucks (namely our small Toyota half-tons) can do just what bigger half-tons do. We can carry a full 1,000-pound load in our 6-foot bed. And we can do it at highway speeds.

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And some things a lot of bigger, more expensive half-tons don't have. Like a front towhook. Tie hooks all around the bed. And a spare tire under the truck that you lower with a hand crank.

Actually, there just might be more reasons to buy a small truck than there are to buy a small car.

Toyota Half-Ton. \$1978*

*Manufacturer's suggested retail price. Freight, dealer preparation, options and taxes extra.

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POPULAR MECHANICS

BOATING TIPS

Make a portable bilge pump

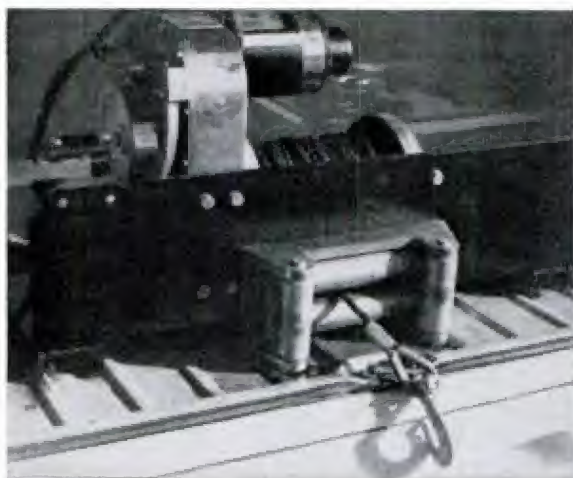
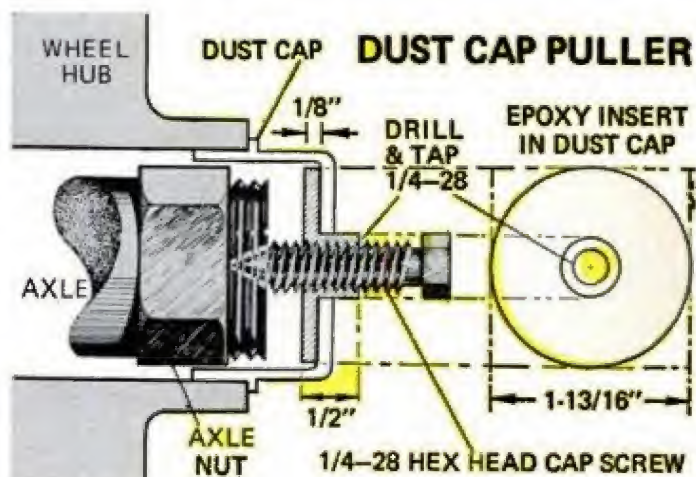
Using a washing-machine pump, an auto-heater fan motor, aluminum strap and Lovejoy couplings, you can make a portable bilge pump. Select a pump that's easy to mount on the carrying handle; look for a fan motor that matches the voltage of your boat battery. (Heaters from Chrysler cars usually come with the mounts shown here.) If motor and pump rotation are opposite, correct by reversing positions of motor brushes. Bend aluminum strip to shape to mount motor in line with pump shaft and join units with Lovejoy couplings. Intake screening can be made from copper roof flashing soldered in place and covered with copper screen.

—Rod Radford, Delray Beach, Fla.



Easy-maintenance wheel hubs

Finding it troublesome to remove dust caps from my boat-trailer wheels to lubricate bearings or replace grease seals, I modified the dust caps (diagram). The insert was turned from mild steel, drilled and tapped, then epoxied into the dust cap which had been drilled to accept it. Now it's a cinch to pull the dust cap with a hex-head capscrew. By removing the capscrew and substituting a grease fitting, I lubricate bearings without removing the dust cap.—Hilary Burton, Huntsville, Ala.



Boat winch in VW Kombi takes huff and puff out of boating

I chose the M6-4611 Warn Electric Winch (normally found on the front bumpers of Jeeps and trucks) to install in my VW to pull my boat from the water. A simple lever operates the winch, and the winch is


always safe behind locked doors while I'm out boating. Not only does it take the huff and puff out of boating, the winch also is great for pulling us out of mud and snow.

—Bill BosHouwers, Denver

Put a 'Wall Outlet'

This homemade portable inverter changes 12-volt d.c. into 117-volt a.c. to power lights, radios, TV sets and other small appliances when you're on a trip

By RUDOLF F. GRAF
and GEORGE J. WHALEN
Photos by Robert D. Borst



PERCHED ON STATION WAGON TAILGATE, the portable outlet operates a TV-set for roadside viewing on a camping trip. Pilot light on front panel reminds you that unit is functioning so you won't forget to shut it off later

in Your Car or Boat

EVER WISH you could carry along a wall outlet on a camping trip or cruise? With this portable transistorized inverter, you can do just that. It gives you 117 volts a.c. from a 12-volt car, boat or camper battery so you can have a wall outlet right on your dashboard. While the power capacity is limited to 100 watts, this is enough to run many small electrical conveniences you normally enjoy only at home, such as a stereo phonograph, radio receiver, tape recorder, electric shaver, lamps bulbs up to 100 watts, even a small TV set.

The parts all fit in a 6x5x4-inch aluminum minibox with a carrying handle on top. This is small enough to store easily in a glove compartment. A flush-type receptacle is mounted in the end along with a pilot light and on/off switch. You can plug directly into this outlet or connect up an extension cord if you want power at some other remote location, such as on a tailgate in a station wagon or inside a tent near the car.

The inverter is designed for 12-volt, negative-ground systems, the most common in use today. It is very important to observe correct polarity or the power transistors will be damaged. For quick, easy hookup, the input leads can be wired to a handy cigaret-lighter plug available at auto-supply stores. The plug can then be inserted in the cigaret-lighter socket on the dashboard whenever you want a.c. power. When not in use, the inverter can be unplugged and stored away. For maximum efficiency, however, it's best to connect the positive lead directly to the positive battery terminal and the negative lead to a ground connection on the car or boat.

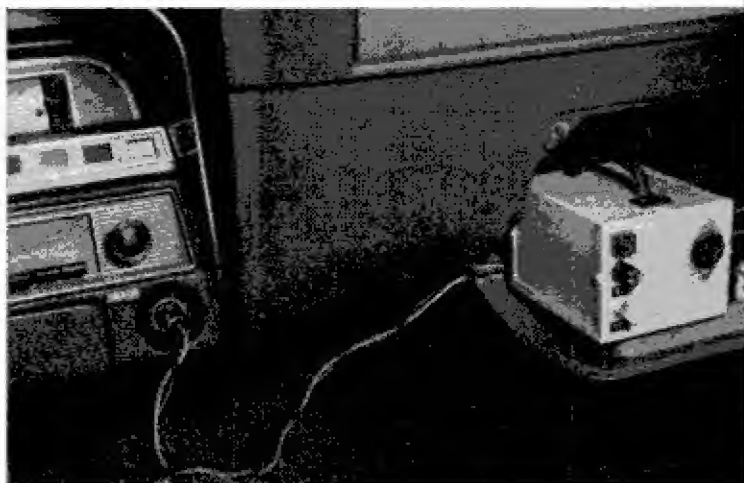
In either case, use heavy 12-gauge stranded wire as the leads must be capable of handling a hefty current flow. If the wires are thin or the connections weak, output at the a.c. end will be reduced.

At the heart of the inverter is a Triad TY-75A step-up transformer. While this lists for about \$20, the finished inverter will still cost you considerably less than commercial models of equivalent capacity. The transformer and most of the other parts are available from Allied Radio

Shack, 100 N. Western Ave., Chicago, Ill. 60680. (Stock numbers in the parts list are from Allied's industrial catalog and do not appear in the current consumer catalog. Use these numbers when ordering parts.)

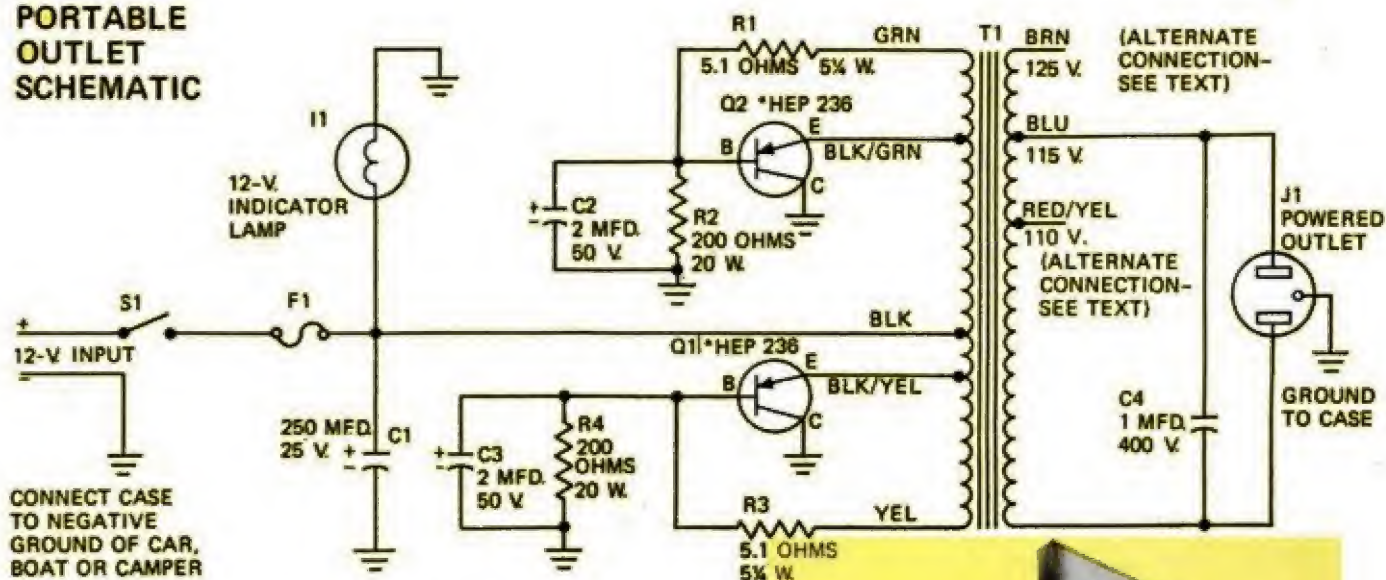
The center tap of the transformer primary (black lead) goes to the 12-volt plus supply. The two halves of the primary are connected to identical transistor circuits. The transistors conduct alternately, producing a current flow first in one half, then in the other half of the primary. This, in turn, creates a stepped-up alternating current in the secondary. Since the transistors turn on and off 60 times a second, the current in the secondary has a frequency of 60 cycles to match that of regular house current. The transistors should be high-power germanium PNP types, such as the Motorola HEP 236 specified or one of the alternates given in the parts list. If you consider other types, be sure they have these minimum specifications: breakdown voltage of 36 volts, Beta 50, and power rating of 150 watts.

The transformer is bolted to the end of the box, but rests on the bottom to carry its weight. The transistors are mounted on the outside at the back for good ventilation and cooling. Because they handle large currents and get warm, it's also important to fasten them firmly so the box acts as a good heat sink. In connecting the



SMALL ENOUGH TO STOW in a glove compartment, the portable inverter travels along with you wherever you go. For quick a.c. power, you just plug it into the cigaret-lighter socket on the dashboard

PORTABLE OUTLET SCHEMATIC



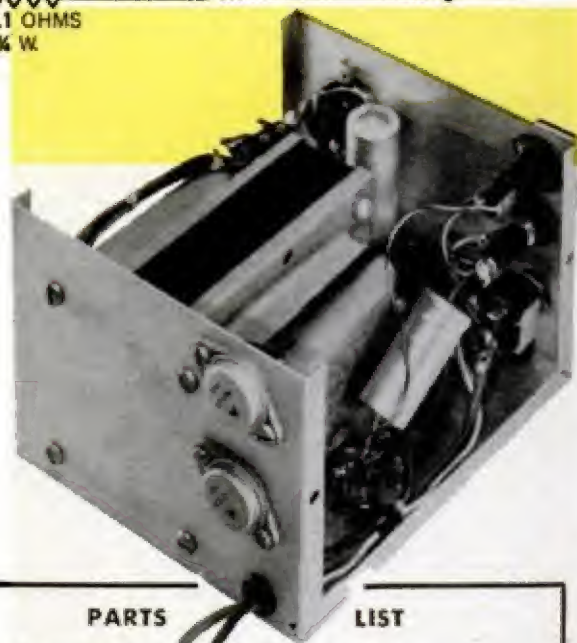
*SEE ALTERNATE TRANSISTORS IN PARTS LIST

MAIN PARTS INSIDE INVERTER are large step-up transformer and capacitors. Note how power transistors are installed on the outside for ventilation to dissipate heat

transistors, note the markings on the leads to determine which is which. Most large power transistors of the type used here are stamped with a "B" and "E" to indicate the base and emitter. The metal case itself serves as the collector. If the leads should not be marked, hold the transistor so the two wires are horizontal and slightly above the centerline of the case. The one on the left is the base and the one on the right the emitter.

You'll find there are several output taps on the transformer offering a choice of voltages. It's necessary to select the one that gives the closest to the desired voltage. Start with the blue lead and check the output with a voltmeter. If the voltage is low, disconnect the blue lead and try the brown one. If the voltage is high, use the red/yellow tap. If a voltmeter is not available, compare the intensity of a 100-watt light bulb first on regular house current, then on the inverter. It should have about the same brightness on both. If it seems too dim, switch to the higher-voltage tap; if too bright, the lower-voltage tap. Use lug-type terminal strips for making connections between components. In use, don't operate the inverter without a load plugged into the outlet. ★ ★ ★

CIGARET-LIGHTER PLUG, shown at right, makes it easy to connect inverter to car's 12-volt supply. Extension outlet can be mounted anywhere you want



PARTS LIST

- C1—250-mfd., 25-v. capacitor (926-1693)
- C2, C3—2-mfd., 50-v. capacitors (926-1254)
- C4—1-mfd., 400-v. capacitor (926-6533)
- R1, R3—5.1-ohm, 5 1/4-w. resistors (875C4400; specify value when ordering)
- R2, R4—200-ohm, 20-w. resistors (875C5000; specify value when ordering)
- T1—Triad TY-75A step-up transformer (945-4075)
- I1—12-v. indicator lamp assembly (844-0744)
- J1—a.c. panel-mount outlet (713-2102)
- Q1, Q2—high-power germanium PNP transistors (Motorola HEP 236 or any of following alternates: 2N3637, 2N3638, 2N3639)
- S1—heavy-duty s.p.s.t. toggle switch with min. 10-amp. rating (717-0523)
- F1—fuse holder (845-0298). Use 10-amp. 3AG fuses (845-0201)
- Case—6x5x4" aluminum minibox (736-3640)



NEW IN ELECTRONICS



FIVE-WAY WIRE STRIPPER makes a handy all-around pocket tool for electrical work. Besides removing insulation from wires (upper right), it has a screwdriver blade at the tip for tightening and loosening terminal screws (left). A wire-bending stud on the side lets you form loops on the ends of leads for making quick connections (lower right). The tool will also cut wires up to 10 gauge in thickness and crimp on solderless connectors. Wire-stripping jaws are adjustable for eight gauges from 12 to 26. Price is \$2.85; Kastar, Inc., Bellport, N. Y.



QUICK REMOVAL OF A CAR TAPE PLAYER or radio is possible with this slide-out dashboard mount. Electrical connections are made automatically by contact strips so there are no wires to detach. A key lock also helps prevent theft. Price is \$14.95 postpaid. Myler Enterprises, Box 2892, Van Nuys, Calif. 91404. Extra dashboard clips, \$7.50, let you switch to a second car, boat or home setup.

PRESS A BUTTON on this new TV set and out rolls a sheet of paper listing the latest weather conditions, sports scores or stock market quotations. The information is carried over regular TV channels and fed to a facsimile machine in the set that reproduces a printed copy right in your home. Seven buttons give choice of different types of information from recipes to travel maps. Still experimental, system was developed by Matsushita Electric, maker of Panasonic TV and hi-fi equipment.

MAY 1971



HOW LOUVERS control light output in Polaroid's new flashcube holder is shown in these photos. At near right, louvers open for maximum intensity on distant shots. At far right, they close down to reduce brilliance and avoid overexposure when shooting close-ups



3 Fancy New Flashguns

PHOTOGRAPHIC FLASHGUNS are getting more versatile every day—and here are three clever new models to prove it. For Polaroid fanciers, there's a flashcube holder that automatically varies flash intensity according to your subject's distance. Another automatic gun is the Metz Mecablitz self-regulating electronic flash—first mini strobe to give you a choice of f/stops. And from Honeywell comes an inexpensive little pocket strobe that operates interchangeably on either regular penlight batteries or rechargeable cells.

Polaroid's ingenious flashcube holder, shown above, is designed to fit four new instant-print color cameras, the 400 series. In front of the flashcube is a set of tiny louvers—like a miniature Venetian blind. The louvers are linked to the lens rack so

they open and close as you focus on your subject. At close range, they reduce flash intensity to prevent overexposures. You can shoot at any distance from 3 to 10 feet and automatically get the right amount of light for a proper exposure. Also new is a special high-intensity flashcube developed by GE for use in the holder. The four new Polaroid cameras that accept the accessory range from \$59.95 to \$164.95. The holder is \$9.95.

Smallest of the new strobes is Honeywell's little 5-oz. Strobonar 100 at left, below. Priced under \$25, it's handy for occasional, spur-of-the-moment shooting because you don't have to worry whether it's charged up or not. Just slip in two



TWO PENLIGHT BATTERIES are all you need to power Honeywell's pocket strobe (above and on camera at near right). It has both hot shoe and sync cord socket. At far right is Metz in vertical position





ordinary penlight batteries and it's ready to deliver up to 150 flashes. Any time you wish you can switch to rechargeable cells, available for \$10 extra along with a plug-in a.c. charger. Guide numbers are 25 for ASA 25 film and 40 for ASA 64.

The Metz Mecablitz below is the first automatic pocket strobe to offer selective f/stops along with self-regulated light output. Instead of being limited to a fixed aperture, you set the opening you want and exposure is automatically controlled according to lens-to-subject distance. Three rechargeable models, the 193, 195 and 196, are \$69.95 to \$99.95. Ehrenreich Photo-Optical Ind., 623 Stewart Ave., Garden City, N.Y.—*Sheldon M. Gallager*



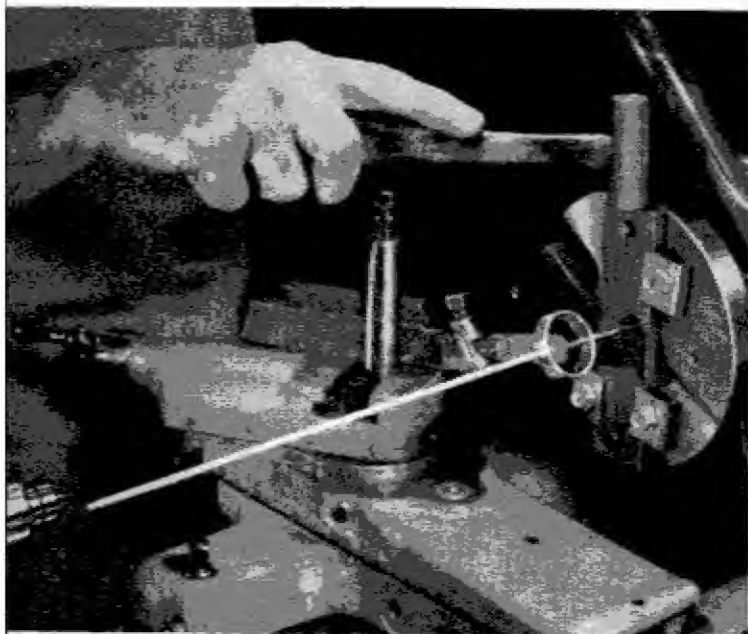
SWIVEL BRACKET on Metz Mecablitz strobe allows you to turn the unit horizontally or vertically, depending on type of flash coverage you want. Like Honeywell unit, it has both hot shoe and sync cord



New Disposable Camera ... Use It, Chuck It

YOU'RE ON A HOLIDAY OUTING and suddenly want to take some pictures, but don't have your camera. No problem. You just stop at a drugstore and buy a roll of instant-load cartridge film. With it you get a small plastic housing that snaps on the cartridge to form a camera. It contains a film-winder knob, shutter release and plastic lens. You shoot the film and discard the housing. Simple as that. Not yet on the market, the disposable camera is expected to cost little more than the film cartridge itself. It's the brainchild of Plastics Development Corp., Philadelphia.





PIVOTED-RING INDICATOR is being used to center a steel bar on the faceplate prior to drilling. With the clamps slightly loosened, work can be tapped in

CENTER INDICATOR FOR LATHE

(Continued from page 129)

gether, with spring on side of E (toward headstock).

An easily made ball-and-socket joint permits the lever to swing freely in all directions without moving appreciably endwise. When the instrument is to be used as an indicator for centering work with respect to a surface such as the rim of a hole, a restraining clip (L) is added. It limits lever swing to a plane, usually one that is parallel to the lathe bed. A

slip-on cap (G) is provided for the feeler point, so it can ride smoothly in a bore, on an outside circumference (such as that of a button).

● **Support bar (F):** The bar shown is meant for clamping in a toolpost slot; the tail portion could be made to fit the bit recess in a toolholder or the slot in a cross-slide turret. It can be made from tool steel or cold-rolled stock, but for maximum wear, should be hardened. Dimensions are not critical, though the $\frac{3}{8}$ -in. thickness at the right-hand end determines the spacing of the spring strips J and K.

● **Cap (G):** This is a rather sliding fit over the feeler end of the lever (H), for use against various surfaces. Brass seems preferable. The indicator might be used without a cap for checking holes and the like, but the cap acts as a point protector and its greater diameter often is desirable. While it can be of uniform diameter throughout, a somewhat larger outer end, shaped like a ball or short cylinder, may be an advantage.

● **Lever rod (H):** This is made from $\frac{1}{8}$ -in. drill rod with ends hardened. The feeler end is pointed about 60° to fit punch marks; other end also is pointed for easy alignment or checking with tailstock center. The lever rod might be jointed for easy storage or addition of extensions. Extensions that make the longer leg extremely long (for greater magnification) should not be too heavy.

● **Ball (I):** This is a $\frac{1}{2}$ -in. bearing ball. Soften it by heating to redness and cool-

(Please turn to page 176)

NEXT MONTH IN SHOP AND CRAFTS

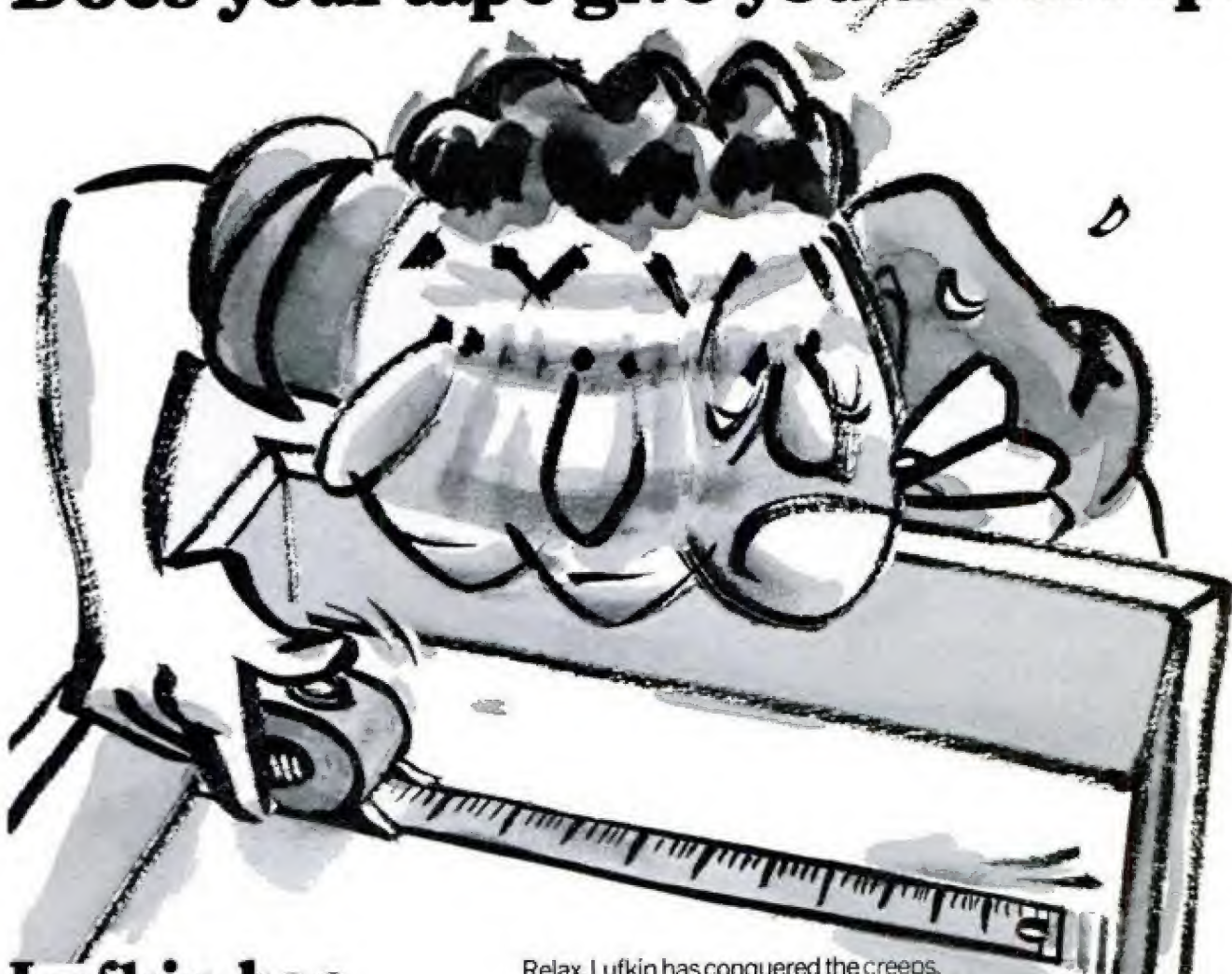
A WORKSHOP CRAMMED WITH IDEAS YOU CAN USE. Last June we published Al Meagher's dream workshop in Minneapolis and asked *PM* readers for more like it. Subscriber Phil Stevens, of Portland, Me., accepted the challenge and sent in snapshots of his setup. You'll learn what *PM*'s Workshop Editor found on his trip north when you pick up a copy of next month's issue.

TIRED OF TURNING METALS? TRY RIGID PLASTIC. The material comes in various forms, including fittings which can give you a head start on projects. It's readily handled on the lathe. You'll find out how to work with the stuff in the June *PM*.

BUILD *PM*'S WATCH-A-MATIC. Are you afraid to go on vacation for fear someone will break into your home? This simple timing device turns on lights (and radio) automatically in various rooms at preset intervals during every 24-hour cycle to make prowlers believe someone is at home. Here's a project you can't afford to be without. Watch for Watch-A-Matic in the June *PM*.

BUILD THIS TWO-MAN SUB FOR \$400. The submariner's world is like nothing you have ever experienced. And if you build the boat yourself, the thrill is even greater. Starting with an aircraft wingtip fuel tank, you build the craft that will let you explore the ocean's secrets. You'll find the details in *PM* next month.

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CENTER INDICATOR FOR LATHE

(Continued from page 174)

ing in air or sand. Then drill a hole diametrically through it with a No. 32 twist drill, followed by No. 31, and finally a $\frac{1}{8}$ -in. bit to bring it to finish size. You can reharden it if desired. The ball can be soldered or cemented to rod H, but that on the model is a force-fit. The rod was lightly knurled for $\frac{1}{2}$ in. beginning 1 in. from the feeler end. This enlarged the rod just enough for a tight drive into the ball hole. The ball can be anchored with a setscrew if desired.

● **Ball-socket strips (J) and (K):** These are identical pieces of springy sheet metal. Those shown were made from steel strap-
ping (0.016 in. thick). They are bolted to support bar F with two 6-32 screws, the one nearer the ball being longer than the other. The "optional hole" in each strip (see photo) was made so a second bolt for regulating grip of strips on ball could be used, but it was not found necessary. With spring strips positioned vertically there is enough spring (give) to allow the indicator point to be pressed into the punch mark without straining any parts.

● **Limiting clip (L):** This serves to limit movement of the indicator lever to one plane, and is used when centering work with respect to an inside or outside surface. Mounting holes are spaced to fit over the projecting ends of the bolts that fasten spring strips to support bar F. A knurled nut on the longer bolt holds the clip; the other bolt end keeps it from pivoting. The rod can slide freely in the wide slot.

Although a spring could be installed to hold the feeler in constant contact with a surface, I found it sufficient simply to loop a rubber band around the rod and outer end of the support bar. The band is placed on either side of the ball joint, depending on whether pressure is to be directed toward front or back of the workpiece. The rod can also be held against the work with your fingers.

It does not take an operator long to become familiar with the working of an axis indicator. In general, to center a punch mark, the workpiece is first centered as accurately as feasible by observation without the instrument. Then the indicator, aligned with the lathe axis, is brought into action for final checking, with the feeler point engaging the punch mark. Rotating the spindle by hand will cause the pointer end of the lever to trace a circle whose size is influenced by the distance the work is offcenter. To adjust the work, it is convenient to consider not the whole circle at once, but only one plane at a time. Then shift the

work, in whatever direction necessary, in the same plane, to reduce the distance the pointer travels.

The two axis finders shown were made for a 9-in. bench lathe. For other lathe sizes, the same general dimensions probably would do, but support bars or other mounting facilities may need modifying.

Center indicators have been produced in various designs. Their universal-joint constructions have included gimbal mounts and rubber-diaphragm arrangements. Making an indicator such as those described involves some lathe work, and is an instructive exercise in construction of accessories that can save time and add precision to shop work. ★★★

GAS-FIRED BARBECUE

(Continued from page 138)

mal use, the briquets should last for years.

● If it's windy, swivel your barbecue with its "back" to the wind before you light it. This is done by loosening the thumbscrew just below the pit.

● Always light your barbecue with the cover wide open. Keep the cover open and leave the control on "high" for about 10 min. to heat the glass briquets thoroughly before you begin cooking. The briquets will not turn color when heated, so allow ample warm-up time.

● For broiling and most grilling you will want to leave the cover open. But for roasting, with or without a rotisserie, the cover should be closed. When it's closed, "low" heat will hold the temperature at about 300°, "high" heat will hold the temperature at about 500°.

● Some "flare up" of meat juices dripping onto the heated glass briquets contributes to the outdoor flavor, but excessive flaming can burn meat. Fortunately, flare-up is minimized with a gas barbecue because you can control the heat. If you trim excess fat from the meat beforehand, most drippings will be dissipated by the radiant heat of the briquets. If flame persists, just sprinkle a little water on the glass briquets to extinguish the flames.

Occasionally, the glass briquets should be turned over to clean and burn off the excess grease. The stainless-steel cooking grids may develop a "rust" color or stain due to intense heat. To brighten, rub with steel wool. The first time the barbecue is lighted, let it burn at "low" heat for about one hour to burn off the newness.

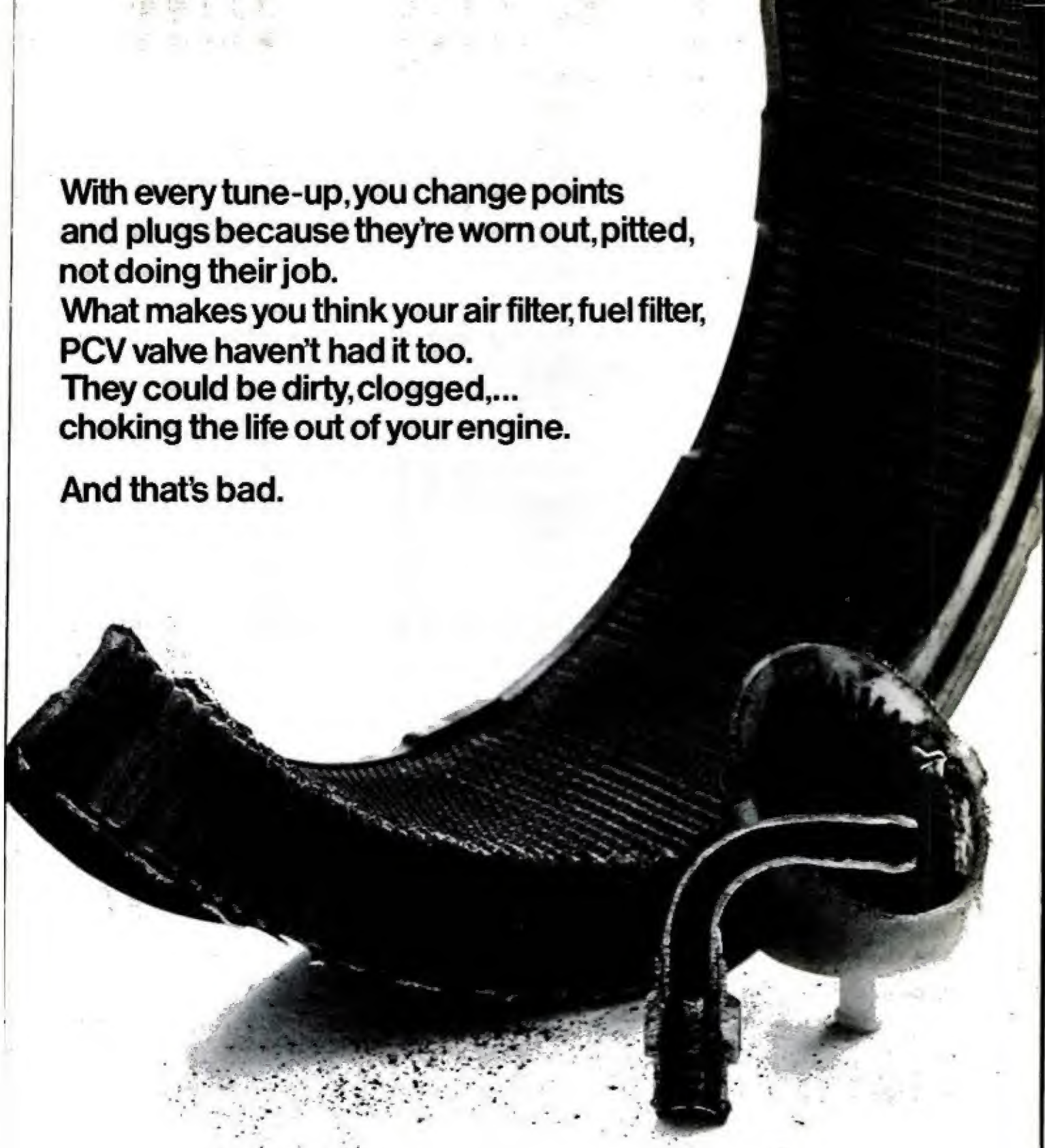
If you're interested in installing one on your patio, write the manufacturer mentioned earlier for the name of the nearest dealer and a price list. ★★★

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choking the life out of your engine.**

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Air filter, fuel filter, pollution control valve.**

That's good.

**Fram Automotive Division
Providence, R.I.**



UNSAFE TRUCKS CAN KILL YOU

(Continued from page 67)

some drivers turn to the amphetamines, "speed" or "bennies."

These drugs are obtainable from illicit sources at many regular trucking stops, especially those near the Mexican border. Mexico has no law against the sale of such drugs without prescription.

A standard item in Kramer's kit is an identification manual which lists most pills by shape, color and markings. Mike and his crew have also learned to recognize the symptoms of drug usage. One driver gave himself away by his constant scratching, a common habit of "users."

It is only the almost automatic skill of such weary, artificially stimulated drivers which keeps them out of trouble, and even this often fails. One, who had capsized his rig, swore that a flight of hornets had invaded his cab. No insects were found either in the cab or radiator screen and he had suffered no stings. He was,

**. . . he had protested the trip
but had no choice—either
take it or leave the job.**

however, mildly "high" on drugs and grossly overtime on duty. The hornets, obviously, were an illusion caused by this combination.

Some of the offending drivers obviously don't care, either about the condition of their trucks or their operation. Mike Kramer has followed at least one large rig at 108 mph, others nearly as fast. Other truckers, however, have little choice. The shoddy equipment and illicit loads are given to them by employers who make it clear that the driver either accepts this as part of the job or looks elsewhere for work. And, in addition to union membership, it is to Mike Kramer and his expert crew that such drivers often turn for help.

"One poor guy I stopped was typical," said Mike. "His load of liquefied gas was overweight and poorly balanced, his bushings were gone, the steering so tight that he couldn't turn the wheel when the rig was standing still. He was actually overjoyed to be inspected, told us he had protested the trip when he was given it but he had no choice—either take it or leave the job."

Some drivers have even reported in advance when a particularly shady caper is being tried which grossly affects highway safety. Truck-stop owners also have

turned in drivers high on drugs or rigs which were about to fall apart.

What is the answer to this hazard of slipshod trucking, faced by every person using the highways? New laws are the usual answer and, indeed, some are forthcoming. Until recently there was nothing to bar a user of drugs from driving a truck. As a result of revelations such as Mike Kramer and his corps have turned up, a new regulation effective this year prohibits a person convicted of such drug usage from employment by trucking companies. A written exam and a road test are other innovations just coming into use.

However, rather than new laws, a better enforcement of those already on the books is considered most necessary. This may mean, as Mike Kramer has proposed, a better instruction of highway patrols, whose officers at present may know little about trucks and their drivers. Certainly it means a better backing of inspectors, who often see their efforts thwarted by meaningless court fines or legal technicalities. Kramer and Arizona are fortunate in this respect: Members of the Corporation Commission there have been known to patrol the highways and climb under trucks with their enforcement officers. Even here, however, when an expansion of this small corps of officers by 14 was requested, only two were approved and none could actually be hired due to a lack of appropriations. This year 16 additional inspectors have been deemed necessary to meet the obvious need.

Similarly, the federal crew of inspectors who work for the Motor Carrier Safety Bureau of the Department of Transport seem far too few and limited in their authority. Just 92 such officers are expected to police the entire country. In Arizona, only one federal inspector covers about a thousand trucking firms, and he lacks even the police power to stop a truck on the road. Such officers must usually confine their time to major truck terminals, and it is hoped that remedial safety inspections at such terminals can be enlarged.

At present, state authorities go mainly after the dangerous driver, federal agents prosecute the offending trucking company, but nobody seems much concerned about the shipper who patronizes and thus sustains or encourages this uniquely dangerous highway user. The shipper may soon be included in future investigations.

Now and for the immediate future, however, every driver whose car is swayed by the passage of a speeding truck can only hope that someone like Mike Kramer has had a chance to make sure that this was not a brush with death. ★★★



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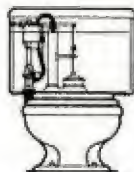


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RUGGED WORLD OF THE DIVER

(Continued from page 71)

lowered. Completely automated and monitored from a shore installation, the platform processed gas from eight wells in the area and piped it into shore. It was a new structure, still getting its finishing touches. A welder in a boatswain's chair was working under the main deck.

Fifteen feet above this deck perched a helicopter pad. From the platform's two boat landings, you reached the upper decks by climbing angled ladders.

I found that it wasn't easy to get from the *Miss D* to the landing because swells made the vessel rise and fall; every fifth or sixth swell was pretty big. "Try to jump at the top of the rise," Tim told me. "But whatever you do, don't let go of the rope."

Several knotted ropes hung down from the main deck. I gripped a rope with two hands (in contrast to the casual one-handed style of the roughnecks), failed to time the swing properly and, feeling like

'Try to jump at the top of the rise. But whatever you do, don't let go of the rope.'

an overweight Tarzan, landed with a thump. My descent to the deck of the *Blue Water* was equally awkward.

The 68-foot *Blue Water*, leased by Packer for this job, looked like a refugee from a junkyard. Decks and bulkheads were splotted with rust, and handrails were almost eaten through in places. The boat had a list to port because of the unevenly distributed weight of air compressors and water pumps on the aft deck. With little free deck space there was a constant danger of tripping over a spaghetti of air hoses, scattered diving helmets and weight belts.

Inside, paint was chipped and equipment looked battered. The single toilet didn't flush. You had to haul up a pail of seawater to do the job. All in all, the *Blue Water* would have given a tidy sailor conniptions.

Boss of the diving operation was Chuck Higgins, a smiling, curly-haired man in his thirties who perched on a high stool in the small wheelhouse and directed dives by means of an intercom. He smoked an endless chain of cigarets, drank cup after cup of coffee, and kept a cool eye on things. His uniform befitted the "captain" of the *Blue Water*—tattered shorts, sweat shirt and sneakers.

Chuck handled the boat expertly, as I

was to witness. He told me he'd been around boats and water ever since he was a kid in Brooklyn. He had spent 10 years as diving supervisor and marine superintendent for a contractor in Venezuela before working for Packer.

He said his crew had been on this job several weeks and was now finishing up. The crew was made up of five divers—Dave McAllister, Dick Williams, Ron Landis, John Joly and Tim Bixler—and tender Bill Gaddis. Also, there were Charles (Shoo) Schumacher and Eugene Anderson from J and J Marine Diving, Pasadena, Tex. Schumacher had to inspect each phase of the job as it was completed.

Three-inch pipes ran from eight wells—called satellites and marked by mast-like structures sticking out of the water—to the production platform. When laid, these pipes had not been buried in trenches, as government regulations required. The Packer divers now dug the trenches with a high-pressure water jetting device: a foot-long nozzle at the end of a hose that was hooked to a manifold on the *Blue Water's* aft deck. As they jetted the trench, Chuck explained, the pipe would fall into it. In time, sediment would fill the trench, covering the pipe.

A second phase of the job involved another problem. At the base of the platform several feeder pipes from the satellites crossed over each other and made contact. One pipe rubbing against another could cause trouble. So the divers were separating the pipes by placing 80-pound bags of sand and cement mix between them. When the concrete hardened, a permanent separation was created.

The heavy-paper sacks of mix were placed in burlap bags (to hold them together until the cement hardened) and tossed over the side. Then the divers went down to position them.

Because of the relatively shallow depth, the divers were using compressed air. They wore helmets and wet suits, and were linked to the ship by an umbilical of three lines: air hose, intercom line and a "pneumo" tube—an air line open at the diver's end. As the diver descends, tube pressure increases to equalize water pressure. The tube is connected to a device on deck that converts pounds of pressure into depth reading in feet. The pneumo gauge was in the wheelhouse next to the intercom, where Chuck could watch it as he talked to his divers. On this job only one man was down at a time.

There was an easy, offhand relationship between Chuck and his divers, which made you forget the work was dangerous. One man had been hurt on the job; he

(Please turn to page 182)



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RUGGED WORLD OF THE DIVER

(Continued from page 180)

was in a hospital on shore. And I remembered something I'd read: So far in 1970 six Gulf divers had been killed at work.

Danger was there, all right, but these skilled pros didn't let it bother them. On one dive Dave McAllister, an ex-Marine who had seen action in Vietnam, reported he wasn't getting any air.

"You sure?" Chuck said.

"Yeah. I'll have to terminate the dive."

"You must be a 22-year-old weakling," Chuck said. "And you don't even smoke." He laughed. "Okay, come on up."

On deck, Dave told me he was already on the way up when Chuck gave him the word. He had signaled his tender with pulls on his hose.

I asked if the problem had worried him.

"No," he replied, smiling. "At 40 feet you can pop up to the top if you have to."

A check showed a compressing-system malfunction. It was quickly corrected.

The final phase of the job moved right

I heard a guy behind me say, 'If those gas pipes heat up, that's it!'

along. Bag after bag of mix was dropped over the side. Divers went down in relays and placed the bags. Shoo Schumacher made his inspection dives.

Then at 2:15 p.m., with the *Blue Water* still tied up alongside the platform, there came a shout from the starboard side:

"Fire! Fire under the platform!"

The deckhouse blocked my line of vision. I ran aft and saw a small, bright patch in a far corner under the platform. Then—with a *whoosh*—the flames swept across the water toward our boat!

I heard the *Blue Water's* engines come alive and I saw two of our guys hop to the boat landing in response to Chuck's command: "Get the lines!"

The flames roared higher, creating a heavy black smoke that oozed skyward.

At the wheelhouse door, Chuck peered at the platform. He was waiting for several roughnecks who scampered down ladders like monkeys. Then I heard Chuck's voice: "In the water! In the water!"

Presuming he wanted us all to go overboard, I thought: "Hell, that's the end of my camera." But I understood what the order meant when I saw a couple of divers tossing life preservers over the outboard side; they'd be there for any survivor who

found himself in the water with nothing to hang onto. Preservers were passed out from the main cabin for us to put on.

I heard a guy behind me say, "If those gas pipes heat up, that's it!" That was the danger. The three-inch feeder pipes from the wells carried gas under 2000 to 3000 pounds of pressure. The pipes were hooked to risers that ran up two sides of the platform and within reach of the flames. If they got hot enough . . . boom!

Now the *Blue Water's* engines rumbled and we pulled away from the platform. From 100 yards away we could see that the *Miss D* was still close to the platform. A workboat, the *Capt. Carl*, had pulled from the platform into open water. Big truck tires, hung over her side for use as bumpers, were ablaze. The tires made that heavy black smoke.

A helicopter suddenly appeared overhead. The pilot hovered next to the platform, angling the chopper so that the rotor's wash was directed at the flames. We could see the fire was dying now, and within a few more minutes it was out. The *Capt. Carl* moved in again and began to hose down the hot lower structure. The fire lasted about half an hour.

When things were quiet again, I talked to Chuck in the wheelhouse. I said that the emergency had been handled smoothly by all of the crews, adding, "But I guess you guys run into this kind of thing almost every week."

"Hell, no," Chuck said. "That's as close to disaster as I ever want to get."

"What would you have done if you'd had a diver down when the fire started?"

He seemed surprised. "We would have stayed put until we had him up. My first responsibility is to that diver."

That night we tied up at one of the satellites. Next morning, under a bright, sunny sky, the last bags of mix were placed. Around noon, we headed for Sabine Pass.

Weeks later, back at my New York office, I learned what had started the fire. An Atlantic Richfield engineer explained that there is a drain running from the platform's main deck into a sump at water level. Liquids that would contaminate the Gulf collect in the sump, which is emptied regularly.

Apparently, heavy gases had been carried into the sump, where they leaked out under the platform. They probably were set off by sparks from the torch of the welder working under the deck.

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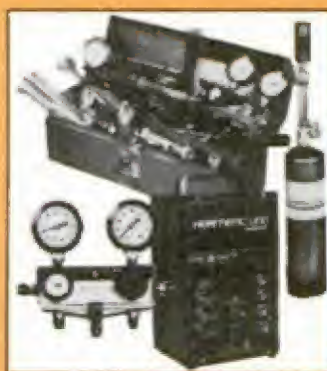
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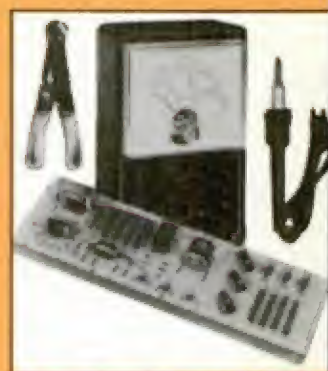
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WAYS TO IMPROVE YOUR RV

(Continued from page 166B)

knee. Study the trailer. Are the trailer and car frames riding level-horizontal? A trailer tongue high or low in front will not tow smoothly. It'll whip and sway easily, bottom over chuckholes and drag its tail in the street. If tongue is high, reduce tension on hitch spring bars. If it's low, increase tension. It may be necessary to move the hitch-head up or down, or to increase or reduce length of the hitch-ball shank to attain that level ride.

● *Pressurize the water system.* Does your older model have a hand-pumped water supply? Install a modestly-priced 12-volt water pump. Then your coach water system will operate at the turn of a faucet. Battery drain is low, convenience of the tap-ready water supply is great. Among other kinds of pressure systems are compact air compressors. I prefer the simple 12-volt pump—you needn't worry whether your old water lines and tank are airtight.

● *Replace thin mattresses!* In the early days of coach-building, many 2-inch mattresses were provided for standard models. Even today, you'll find a few in overhead bunks, though most are 4 inches thick. Most any RV dealer can obtain a 5 or 6-inch mattress on order. Thicker mattresses provide both extra warmth and comfort.

● *Add an overhead bunk*—maybe two of them, to handle the extra guests your kids chronically invite along. Simple hanger-brackets screw to the wall for pipe-support hammocks. Or install sliding-type bunks which pull out for sleeping, push back to the wall to eliminate overhead restrictions.

● *Get heavy-duty shocks.* Years of road-testing recreational vehicles convinced me that standard shock absorbers on a motor home, pickup, or sedan rarely are any good after 10,000 miles. On some models, shocks succumbed at 5000 miles. In any case, heavy-duty shock absorbers will greatly improve performance, stability and tracking ability. They prevent wheel-hop; help keep your vehicle in a straight line. They minimize tire wear, too, and keep them in balance longer. On some test models, the difference in general stability after switching to heavy-duty shocks was positively amazing.

● *Replace chemical toilet* with a new recirculating model with greater capacity without adding a holding tank. Complete instructions come with an Aqua-Magic, Mansfield, Monogram or several other units in this field. A space about 2 by 2 feet is enough for the recirculating toilet. ★★

YEAR OF THE TRIPLE CROWN

(Continued from page 85)

last season. Bobby was the hero of the '68 Indy 500, winning it at 152.882 mph.

[Editor's note: Swede was hurt in this spring's Questor Grand Prix; as of now, extent of his injuries is undetermined.]

The younger Unser, Al, Indy winner last year in the Johnny Lightning Special of Parnelli Jones, will be looking to do it again in the Ford-powered racer. The defending national champion (4890 points on the Championship Trail) averaged 155.749 mph for the 500, slightly off Andretti's 156.86 of a year earlier. Before a long yellow near the end of the race, Al was blistering the Brickyard with laps over 160 mph in the bright blue Colt.

Both Cale Yarborough and Lee Roy Yarborough, neither a stranger to Indy, will be running all three 500-milers. Lee Roy is expected to be in a Brabham and Cale has joined Lloyd Ruby driving for the Gene White team.

Johnny Rutherford, front-row starter at both Indy and Ontario last year (the only driver with that honor), will be looking to improve his luck driving a Michner Petroleum entry. Jim McElreath, USAC veteran and winner of the inaugural California 500 at Ontario in a two-year-old Coyote-Ford, will be out to try to start a streak. Two Foyt Coyotes were officially entered for Indy in February and two more were expected to be entered soon after. A.J. will be driving for an unprecedented fourth win in one of the Coyotes.

Vic Elford, another British driver, has a unique ride. Ray Caldwell, of Autodynamics fame, should by newsstand date be well along establishing the Indy-Ontario Corp.—a publicly owned corporation set up to field a team on the lucrative Marlboro Championship Trail.

The very first driver to get in his entry for Indy was Dick Simon. A rookie at Indy last year, he placed 14th, but followed that with a beautiful third-place finish at Ontario in his Vollstedt-Ford.

There will probably still be some shuffling of drivers and rides before and during Indy qualifications May 15-16 and 22-23. One thing that won't be the same at Indy this year is a change in qualifying rules that gives entrants set for a qualification attempt on the first day of time trials a guaranteed shot at the pole even if they're rained out on that first day.

The other thing that won't be the same at Indy this year is that the race will be just the first 500-miler, and you know there won't be a driver out there who's not dreaming the impossible dream: winning all three! ★★

WE ADDED ON AND SAVED . . .

(Continued from page 109)

house with the new fiberglass siding used on the wing. Cost of remodeling the old section is not included in the time and cost figures for the wing, but the amount does include the heating system installation. The difference in time and money for the extra ductwork required was minor.

Did I have help? Yes. You do need help with some things—handling heavy trusses, raising ceiling panels, closing in the roof before the rains come and so on. The foundation hole was contracted. A local electrical contractor relocated the primary electrical service box and Sears engineers contracted the entire heating system. Three husky sons of a neighbor were hired for a wide assortment of jobs from earthmoving to paneling, roofing and masonry. A brother (electrical engineer) helped with the wiring and building the new furnace chimney; a nephew helped with the framing, roofing, and substrates. And my wife, a genuine good sport and house enthusiast, was a willing painter and general helper. Friendly relatives, incidentally, who knew they'd be invited up later, made dandy volunteers. It all helped speed the project to completion.

The cost of the paid help mentioned above is not included in the materials figure. You buy what your budget allows.

Including all help, however, paid and volunteer, 1428 man hours were spent on the wing alone. It involved 54 weekends (seven of them three-day affairs) and two three-week vacations.

The satisfaction of watching a house grow under your own hands can never be appreciated by anyone who hasn't built one, and it's not as hard as you may think. We learned many techniques that helped speed the work. You'll find 20 of the best ideas on pages 112 to 115.

The framing in our wing is similar in design to the original house. We used a stepped foundation wall in which the last course of block is 4 in. wide. Joists rest on a sill behind the top row. This stunt lowers the house into the foundation wall, permitting the use of standard 4x8-ft. panels for sheathing and siding.

A single, 44-ft.-long, doubled-up 2x12 header supports the roof trusses across the long spans of garage doors and between the posts at the front.

Roof and sidewalls were tied into the existing house after erection—but before interior surfaces were covered. The critical task of making a waterproof joint where the roofs meet will be detailed in the June *Popular Mechanics*. ★★

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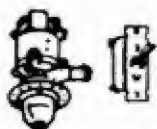
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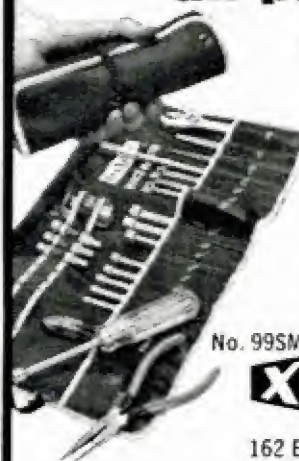
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PRODUCTS FOR THAT 'PRO' JOB

(Continued from page 111)

stone, old boards—which faithfully reproduce even undercuts in detail.

All these products are so like the real thing that the most discerning eye is deceived. The "antique brick" I used to sheath an ugly cement-block chimney looks so genuine that the manufacturer inserted a few real bricks in a panel at a recent homebuilders' show and offered \$2 to anyone who could pick them out; it cost him only \$18 during the show's five-day run. Cost of these panels is high—\$1 to \$1.75 per sq. ft. depending on pattern. But the first time you don't have to have your house painted, you've made back that extra investment. And the masonry panels are, of course, far cheaper and easier to install than the real thing.

Another tidy new product for the do-it-yourself builder is the Majestic-Thulman packaged fireplace and chimney assembly I installed in the den-guest room. Built of steel and asbestos, it can be seated on a wood floor and set against flammable rear and side walls with no fear of fire hazard. The stack, three concentric steel cylinders, is insulated by circulating air. I installed the whole rig single-handedly in a week-end. I faced the unit with native stone, but it can be framed safely in wood or simulated masonry.

Did you ever wish you could install a real slate flagstone entry floor without ripping up the deck to pour a bed of cement for the stones? You can. Vermont Slate makes up a package of pre-cut $\frac{1}{4}$ -in. flags in random sizes and colors. Just set them on the wood floor in mastic and grout. I paved our 4x12-ft. entry on a Saturday afternoon. Swab the slates with a silicone sealer and buff with Butcher's wax for a stainproof, waterproof surface.

One real problem in a house built over crawlspace—as the *PM House* was, due to shallow bedrock—is central heating. Where do you put the furnace without tacking on a shed? Answer: In the crawl space. Though few manufacturers promote them loudly, most make "horizontal" furnaces for gas or oil fuel. These compact units slip into as little as 24 in. of clearance between floor joists and slab. ★★★

PRODUCT SOURCES

Fiberglass panels: Cavrok Corp., Dept. PM, Industrial Park Ave., Vernon, Conn. 06086

Packaged fireplace: Majestic-Thulman Co., Dept. PM, Huntington, Ind. 46750

Slate flooring: Vermont Cut Slate, Inc., Dept. PM, Fair Haven, Vt. 05743

Horizontal furnace: Sears, Roebuck & Co. Available at Sears stores, or through Sears catalog.

INTERNATIONAL TRAVELALL

(Continued from page 135)

and promptness far exceeds the average service department; very efficient." "Very good, fast service except during our short farming season, but I can understand that."

On style and styling: "The car could stand a little more interior plushness to compete with other family cars"—Colorado contractor. "Our 4x4 is so high it's sometimes difficult to see a small car immediately behind"—Ossining dentist. "The standard model has few unnecessary frills, but I liked the 1962-65 Travelall better. They should keep it a *working* vehicle and not try to make it a station wagon." "Put a wind deflector over the rear window to help keep it clear." "Needs a place to carry tools out of sight; also bigger glovebox." "I like the styling of this one better than the older one I had."

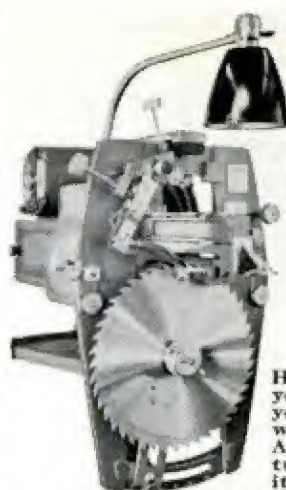
A surprising percentage of PM's respondents own Travelalls with four-wheel drive. Only 12 percent, though, listed the 4x4 feature as a specific reason for buying. We asked, "What percent of your driving is in 4wd?" Nearly 9 out of 10 said less than 10 percent. Only 2.3 percent spend more than 25 percent in 4wd.

As for towing, 58.6 percent tow house or camp trailers (half and half exactly); 81.4 percent tow trailers weighing more than 1500 pounds gross. A significant number specified Powr-Lok differentials (48.7 percent) plus the 16-gallon auxiliary gas tank (12.1 percent), while a whopping 71.4 percent ordered that most expensive of all single accessories, airconditioning.

The Travelall offers a wide range of accessories and options and, as a rule, both the customer and salesman know more about them than in normal new-car transactions. The International factory puts out recommendations on specific power combinations, listing them by load and towing weights; light, average, and severe service; plus types of general vehicle use.

There are five engines to choose from; six transmissions (including a five-speed manual); independent, I-beam or driving front axles; seven rear-axle ratios; plus a variety of spring rates and load packages, including Air Ride. Heavy-duty cooling, battery, electrical system, high-altitude equipment, and a super-capacity heater/defroster are also available. Torsion-bar independent front suspension is standard on the 1010-D.

Travelall owners aren't out for ordinary transportation. They pay for something extra and by an overwhelming majority they enthusiastically agree that they get it. ★★



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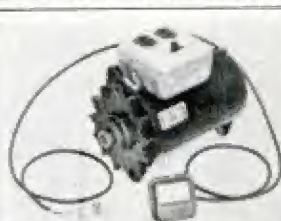
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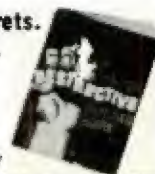
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STEAM From manifold to carburetor. Cleans out carbon, motor lasts longer, gas burns slower, more leverage on connecting rod, 20% more power, up to 30% better mileage, greatly reduces pollution, and easy installation. Only \$12.95 check or money order. 30 day money back guarantee. Berger Patented Gas Saver, Erskine, Minnesota 56535.

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AUTO Parts for old and new Cars. All makes. Catalogue \$1.10. Antique Auto, Milwaukee, Wisconsin 53204.

PARTS: Army jeep and truck parts. Spare Parts & Equipment Co., P.O. Box 751, Lexington, Ky. 40502.

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BUILD Your Pickup Camper. Precut kits, blueprints and supplies. Literature 25¢. Comstock Camper and Trailer Supply. Dept. 664, Parsons, Kansas 67357.

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MOTORCYCLE Turn Signals. Accessories Catalog 35¢. Houston PM Lockport, Illinois 60441.

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ILLUSTRATED Catalog 25¢. Parts, Accessories. Custom Stock, most makes, models. Cycle Supply, Box 192M, Fairbury, Ill. 61739.

INDIAN PARTS. Rebuilding. Accessories. Indian Motorcycle Sales, Kansas City, Missouri 64127.

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FREE METRIC Tool information, write: MediaMetric, Box 461F, Media, Penna. 19063.

MINI-BIKES. Motorcycles. Go-carts. Supplies. Wholesale catalog 25¢. Loren Products, Danville, Illinois 61832.

ELECTRIC Bicycle. Ride All Day For Nickel. Complete Plans \$3.00. Electro, Box 27203P, Indianapolis, Indiana 46227.

(Continued on next page)

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BUILD—One-Man jet helicopter. Easy inexpensive. Detailed plans, drawings—\$5.00. Helicraft, Box 7153, Baltimore, Maryland 21218.

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KNIVES: Bargains for Hunter, Fisherman, and Outdoorsman. Modern Sportsman Company, Box 11545-B, Salt Lake City, Utah 84111.

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(Continued on next page)



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MOLDS For fisherman's sinkers, jigs, squids, casting and spinning lures. Free catalog. Sweet Molds, Tonawanda 1, New York 14150.

SEND For FREE Wholesale Catalog. The most complete and fully illustrated catalog of reels, rods, beads, spinners, jigs, bodies and parts, sinker molds, feathers, tools, hooks, rod blanks, rod parts, swivels, wire, etc. FINNYSPOITS, ME Sports Bldg., Toledo, Ohio 43614.

MOLDS—For casting your own fishing sinkers. Free illustrated booklet. Reading Instrument Co., Box P78, Reading, Pa. 19603.

FISHERMAN'S DREAM BOOK—FREE, 170 Pages, pocket size and loaded with Hard To Find Fishing Specialties and Do-It-Yourself Goodies. Our 27th year. NETCRAFT, Inc., Box 5510, Toledo, Ohio 43613.

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EARN Money raising fishworms for us! Exciting details free! Oakhaven—56, Cedar Hill, Texas 75104.

HYBRID Redworms 5000 \$10.00, 20,000 \$20.00 Postpaid with Raising Instructions, Worms, Route 9, Waco, Texas 76705.

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UNLIMITED Potential Profits raising Better-Bred Fishworms. Soilless Nografin Method. Lee's, Box 326-M Queen City, Texas 75572.

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TRAP ANIMALS ALIVE! Rabbit, mink, enter either end NEW box trap. Quality plans \$2. Waring's, 124 Myers Rd., Galt, Ont., Canada.



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PROFITS FROM CLASSIFIED ADVERTISING! Booklet shows you how to start your own business with Classified Advertising. Only \$1.00 (Refundable with first order.) C. A. Martin, Popular Mechanics, Dept. PM145, 224 West 57 Street, New York, N.Y. 10019.



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QUAILS, Incubators, cages, supplies catalog. Marsh, 14216 Brookhurst, Garden Grove, Calif. 92643.

EGGS, Chicks (started & adult). Pheasant, quail, chukar, waterfowl, turkey—game & ornamental. Bantams & chicken. Free price list. Northwest Farms, Inc., Box 3003 (PM), Portland, Oregon (503) 233-4659.

RINGNECK Pheasant Chicks. Day Old, A-1 stock, 25, \$15.00. Blonhaven Hunting Preserve, Milton Jct., Wisconsin 53564.

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(Continued from preceding page)

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(Continued from preceding page)

CASH Prizes offered each month in a new contest magazine. For free copy write Multigames, Dept. P, Box 307, Ypsilanti, Michigan 48197.

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(Continued on next page)

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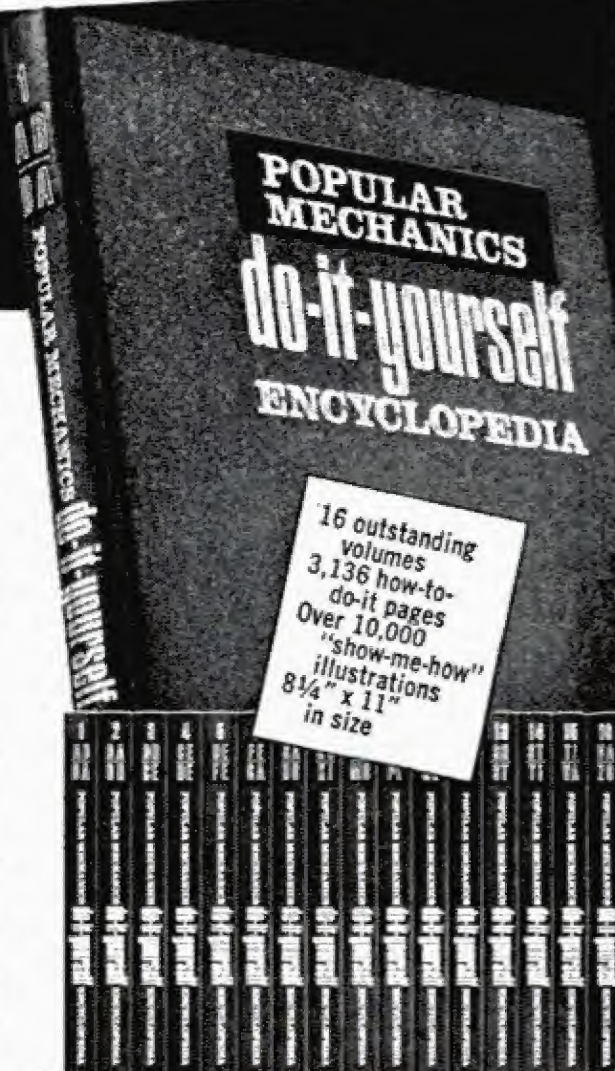
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